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## Progress in Fuel Matters Features Annual S. A. E. Meeting

Much interest attaches to developments in fuel research of past year. Chassis session also brings out much discussion. Aeronautic sessions are well attended, while those devoted to body engineering and highways also prove highly successful.

By Herbert Chase

**T**HE annual meeting of the Society of Automotive Engineers, just completed in New York, is regarded by many members of the organization as the best in the history of the Society. All of the sessions were well attended and the plan of holding simultaneous sessions on subjects not closely related proved very successful.

The fuel session, being as usual the most important, was the best attended, and those who were present could not have failed to carry away much useful information or avoid the conclusion that the persistent consideration of matters relating to fuel and its proper utilization is beginning to show results at least in the improvement of many of the automotive vehicles now being designed and produced.

There is, of course, a long distance still to be covered before it can be said that the average automotive vehicle is using fuel in a thoroughly efficient manner, and there still remains the stupendous problem of getting higher average efficiency in the operation of the nearly nine million automotive vehicles in use to-day. This, indeed, is a problem worthy of the best efforts of the most capable engineers, yet receiving scant consideration. As pointed out by speakers at the meeting, the average automotive engine now in use not only runs throttled a large percentage of the time—a condition under which high economy is impossible—but less than 75 per cent of the fuel enter-

ing the cylinder is burned in the average case, and definitely proved in one paper covering tests of a full hundred passenger cars and trucks. This waste of fuel is just as real as if 25 out of each hundred gallons of gasoline put into the car or truck tank was allowed to leak out, and is far more harmful than if so lost, for it results in many engine troubles, yet little or nothing is done to check the loss though it might be well nigh eliminated if car manufacturers were sufficiently interested to supply modern manifolds and carbureters and see that the service station and user are acquainted with the facts and educated to the importance and feasibility of bettering the fuel utilization of the car now in service.

The most discussed and perhaps the most valuable paper presented was that entitled the Fuel Problem in Relation to Engineering Viewpoint, by A. L. Nelson, chief engineer of the Premier Motor Corporation. The stated object of the paper was to get the engineer to take a broader viewpoint of the fuel situation and not to take the position that things which heretofore have not been commercially successful or feasible are by no means impossible of attainment. The paper, which will appear in an early issue of AUTOMOTIVE INDUSTRIES, should be instrumental in attaining this commendable object, but it goes much further than its title indicates in a most original and instructive presentation of data which no engineer who wishes

to be conversant with promising methods of improving car performance should fail to acquaint himself with. The author shows in the first place how small a proportion of the available power of the engine is required to propel a car at moderate speed on the level road, and points out how low a power factor with consequent low fuel economy results. It is then shown how economy and performance can be greatly increased by increased compression ratio, made feasible by a very late closing of the inlet valve. The effect of gear ratio on economy is also set forth and some new designs of piston and inlet manifold are described.

In discussing this paper C. P. Grimes laid stress upon the need for bettering the load factor as a means of securing better economy and briefly outlined tests he had recently made which showed that greater economy results from carrying a greater spark advance than is commonly employed under part throttle conditions. He suggested the need for some interconnection between throttle and spark advance mechanism when the latter is automatic as it then must be set to properly function at full loads when at the same speed and part load a greater advance can be used to advantage. H. L. Horning, among others, commended Nelson for the valuable paper he presented. He suggested that less valve lift than was employed by Nelson would have resulted in greater turbulence in the charge with good effect.

#### Fuel Waste in Present Cars

An item not on the program which proved of considerable interest was a report of tests conducted by the Bureau of Mines for the purpose of determining the percentage of unburned products in the exhaust of a large number of cars selected at random and tested under normal operating conditions in precisely the same state of adjustment (or lack of adjustment) in which they run in normal use. This report showed that in the average case the exhaust contained only 9 per cent of carbon dioxide, completely burned carbon, while the average percentage of carbon monoxide (partly burned carbon) was seven, and the unburned hydrogen and hydrocarbons was over 3 per cent. Not a car was found in which more than 95 per cent of the fuel was burned, and as previously stated the average percentage burned was under 75. This means that the average car is using an effective air to gas ratio of only 12 to 1, a ratio of 14 to 1 is the theoretical ratio for complete combustion, and 16 or more to one is usually required for maximum efficiency. In other words, the average user employs a much richer mixture than is necessary, though in so doing his fuel bill is about one-third higher than necessary and troubles from carbon deposits and crankcase pollution, to mention only two evil effects, are encouraged. Until steps are taken to remedy this condition service problems will continue to multiply and the fuel problem will continue to grow more menacing.

In discussing this Bureau of Mines report Elmer Sperry drew attention to the fact that not even a trace of carbon monoxide was found in the exhaust gas of several Diesel engines in tests he had directed, although the fuel commonly employed is far less volatile than that used in conventional automotive engines. He spoke also of the apparent dread which the average engineer has of attempting to use high compression in engines, in spite of the fact that this involves little more than the addition of about three piston rings. A piston so fitted will, he said, fall of its own weight through the cylinder, and have little more friction than ordinary pistons.

C. F. Kettering's talk was similar in many respects to those he has given at past meetings of the Society, although he freely admitted that theories he had formerly

evolved had been modified in many cases as new information had been accumulated. He feels that the fuel problem is beginning to be appreciated both by the automotive and fuel industries. He drew attention to the general misconceptions which a lack of understanding of terminology have brought about and said that it aids greatly in the understanding of combustion phenomena to remember that changes in temperature due to addition or subtraction of heat are simply interpreted as meaning increase or decrease in the velocity of the molecules of the substance heated.

Frank A. Howard, development manager of the Standard Oil Co. of New Jersey, in his paper on the Volatility of Internal Combustion Engine Gasoline first defined the term "gasoline" as "the cheapest petroleum product acceptable for universal use as a fuel in the prevailing type of internal combustion engine." He then showed the physical meaning of the term volatility, the vapor tension method of measuring it, laid stress on the fact that inherent volatility is dependent upon time, surface and heat. He commended the use of so-called hot-spot devices for adding heat to the fuel entering an engine and made it clear that heating the air only is not effective for the reason that air is a poor conductor of heat and therefore will not bring about vaporization of the fuel in the limited time available. The hot-spot will do this if so arranged that the fuel particles are thrown out of the insulating air stream against it and manifold "condensation" is impossible under the average manifold temperature prevailing because it is physically impossible for any vapor to condense when its partial pressure is lower than the vapor pressure of the liquid itself at that temperature.

Howard believes that the hot-spot, when properly designed, is an effective and simple solution of the problem, that it should be incorporated in new designs, and that it will lend itself to attachment in existing engines.

Howard, who was the only speaker who could be said to represent the point of view of the fuel industry, expressed himself as being pleased with the indications of progress in solving the fuel problem which were brought to light during the meeting.

#### Flame Movement in Closed Cylinders

The paper on Flame Movement in a Closed Cylinder by C. A. Woodbury was read in the absence of the author by his assistant, Mr. Lewis, and developed much useful information which supplements, and in part corroborates the work done by Prof. H. B. Dixon in England. Dr. Woodbury plans to continue this work and report upon it further at later meetings of the Society. To date the fuel used has been a fixed gas, acetylene, but it is the plan to later experiment with more complex fuels, such as are used in internal combustion engines. Results thus far appear to indicate that true detonations do not take place in cylinders of the size employed in automotive apparatus, but final conclusions in this regard are reserved pending the completion of further tests.

In a paper entitled Air Temperature Regulation Effects on Fuel Economy, R. E. Fielder of the Fifth Avenue Coach Company, the thermostatic device designed for use on buses operated by his company for controlling the temperature of air entering the carburetor. With this device it has proved possible to make an average saving of about 8 per cent, which means much when it is considered that the company uses several million gallons of gasoline each year, the fuel bill constituting the second greatest item of expense. The temperature control device is reported to afford the greatest possibility of saving in fuel of any of the numerous fuel devices tested.

The only other paper read at the fuel session was that



by Dr. H. C. Dickinson of the Bureau of Standards in which he gave a résumé of certain research work relating to fuel which the Bureau has been conducting. This work included some studies of conditions known to aggravate the tendency of an engine to knock. In order to prove that the knock is due after all to an aggravated piston slap, a piston with excessive clearance was tried, and it was found possible to readily distinguish between knock due to combustion phenomena and piston slap.

Other tests involving the use of one or two spark plugs used separately or together were conducted, and it was found possible to bring about conditions in which firing from one plug would cause a knock when firing from two plugs would not do so and vice versa. The reason for this is not yet apparent, but it is thought probable that the knock can be controlled by accurate timing of the center of the explosion. It has been noted that pressures in excess of 1000 lb. per square inch may result from the knock phenomenon, and that the latter is invariably accompanied by a sudden rise in temperature of the jacket water.

Thomas Midgley, Jr., stated that some believe that the temperature occurring at the time of the knock may be sufficient to convert carbon into the gaseous state. In

any case quartz cylinder windows have enabled observation of the fact that an extremely brilliant light accompanies the knock. Spectrum analysis of this light reveals a green line thought, but not definitely known, to indicate carbon gas. Mr. Weinberg questioned this, stating that the highest temperatures attainable in a carbon arc in vacuum are not accompanied by gasification of carbon. He cited experiments that he has conducted on a 5 $\frac{7}{8}$  by 6-in. air-cooled engine developing 35 hp. at 900 r.p.m. This engine cools very well, he said, when the spark plug is placed near the inlet valve, but when placed opposite the exhaust valve it is impossible to keep the engine cool.

H. L. Horning, in closing the discussion on fuel, cited the need for tests that would enable a measure of carbureter efficiency independent of engine performance, and outlined a test that he believes will give the desired result. He spoke of the plan for co-operation between the S. A. E., the American Petroleum Institute, the Bureau of Standards and the Bureau of Mines, and indicated that plans for financing research work bearing on the fuel problem at the laboratories of the two organizations last mentioned are being formulated and will shortly be announced.

## The Chassis Session

By P. M. Heldt

**H.** M. CRANE presided at the chassis session, which was held in the Auditorium of the Engineering Societies Building, and was well attended. In opening the meeting Mr. Crane said the principal object was to discuss various questions which had come up from time to time in connection with the work of the Fuel Committee. Questions were constantly being asked as to why we burned so much fuel per passenger mile or per ton-mile. The petroleum industry had taken a certain view regarding the small car which called for comment. Comfort and speed were factors which could not be neglected in passenger-car design, even if somewhat more fuel had to be burned in order to provide them. We could not rationally ask the public to ride in open cars without top or windshield to save fuel.

We were often asked why we were using low-g geared cars. The answer was that the public wants them. Possibly the public wanted low-g geared cars because of the difficulty of gear changing. Unfortunately, the design of the present type of engine was such that if we cut down its power we also reduced its economy. The speaker said he had been told that on a flat stretch the most economical way to drive a car was to accelerate to full speed as rapidly as possible and then let the car coast with the engine cut off.

One reason for poor fuel efficiency was defective brake rigging, with the result that the brakes were constantly dragging, there being no means for rapidly adjusting them. Defective gearbox and axle design were other causes of low fuel efficiency. The housings of these parts were often of such design that the parts could not be lubricated by oil, and grease was generally a poor lubricant. In cold weather the grease becomes very stiff, so that a large amount of power was required to turn the gears, and everyone was familiar with the fact that occasionally it was impossible to shift the gears at all on a cold morning.

A paper on a Suggested Rating Rule for Racing Cars

was presented by Mr. Crane, of which he gave a brief abstract only. Reference was made to the present racing rule, limiting the piston displacement of the engine to 183 cu. in. and it was pointed out that the piston displacement limit had led to such developments as enormous valve areas, huge inlet pipes and carbureters, extreme valve timing, and very light reciprocating parts. However desirable these features might be for racing purposes, they were undesirable in commercial engines. Those first mentioned made good performance at moderate and low engine speeds impossible with the present type of fuel, while the very light pistons used could not be expected to give either reasonable wear or proper control of lubrication in commercial service.

Mr. Crane's suggestion was to use a rule whereby cars would be rated in accordance with the piston displacement per mile actually used by them. Such a rule would involve rear wheel diameter and gear ratio, as well as the piston displacement of the engine. He pointed out that racing is very expensive, and expressed the opinion that such a rule would be of greater help in developing commercial design of passenger cars and trucks by enabling engineers to get some really valuable lessons from racing.

The second speaker was J. G. Vincent, who spoke briefly on Economy and Performance Demands. Mr. Vincent said that the average user, when thinking of economy, thought only of gasoline economy. However, the gasoline bill was not the chief item of expense, as a rule. Engine design was limited by the demand for performance. An acceleration of from 5 to 30 m.p.h. in anywhere from 12 to 14 seconds was generally desired. The engineer then had three choices: He might select a high speed engine with a gear ratio of about 5 $\frac{1}{2}$  to 1, a medium speed engine with a gear ratio of about 4 to 1, or a low speed engine with a gear ratio of 2 $\frac{1}{2}$  to 3. The speaker did not believe that so far as the engine was concerned, there was any great difference in respect to thermal efficiency because the larger engine would

have to be operated at a lower compression pressure.

Mr. Vincent expressed the view that entirely too much importance had been attached to the effect of the throttle on economy, and not enough to the friction of the engine. Probably everyone had tried the experiment of gradually reducing the amount of lubricant supplied to the engine, and he for one had been surprised at the small amount of oil to the cylinder that he "could get away with," but in thus cutting down the lubrication he had experienced other troubles which he had not looked for, such as increased crankcase dilution. In the matter of tires, he believed there was such a thing as oversizing, as well as undersizing, and the happy mean was the best. It was not possible to lay down rules as to how big a car to build, because different people demanded different sizes. Service costs were in proportion to simplicity, reliability and accessibility, which features he did not pretend to have given in the order of their relative importance. The automobile designer would do well to take out a sample car and test it on the road for a few months, taking care of the car himself, before turning it over to the factory. He would often be surprised what a number of parts had to be taken off before he was able to get at any particular part that needed attention. If there should come about a great change in the matter of performance requirements, the four-speed gearbox would get more consideration again.

#### Chassis Design for Fuel Economy

A. L. Putnam presented a paper on Chassis Design for Fuel Economy. Mr. Putnam stated that engines are now so reliable that they require very little attention, hours being usually spent on other parts where only minutes are spent on the engine. He wished to call attention to some of the losses in other parts of the chassis. Following are extracts covering the main points made in the paper:

The anti-friction bearings give very little chance for any considerable improvement. But the practice of using in the transmission and rear axle a very heavy grease which solidifies at even a cool temperature is far from economical from the standpoint of fuel economy and efficient lubrication. This is particularly the case when the car is frequently stopped and started and used intermittently in very cold weather. It is now perfectly possible to make and install gears which will pass as to sound even if not smothered by "dope." It is also possible to construct properly vented transmission cases and differential housings which will hold thin oil with even less leakage than we have at present with heavy oil.

The great congestion of traffic in cities has brought about a very common custom of insistence on a brake adjustment which gives instant action with a very small pedal movement. The external-band brake is a very poor instrument to fulfil this condition. It is virtually impossible as a matter of common practice to adjust it closely enough to suit and still not drag some. As the quick brake must be had at any cost, the larger number are dragging. A dragging brake which does not heat enough to call attention to itself by developing excessive heat at a moderate speed still has a marked effect on the position of the throttle and is the cause of wasting much fuel. Brakes are pulling from a mere fraction to several horsepower per pair out of the majority of cars equipped with them. The internal-expanding type of brake is much better adapted to extremely close adjustment without dragging and the heat it generates expands and contracts the drum in the right direction with relation to the shoes instead of the wrong direction as in the case of the external-band brake.

The excessive amount of motion between the engine

and the axle, of course, causes a loss of power and fuel in a minor degree due to joint angularity which produces wear; it takes power to produce wear. I think that this excessive amount of movement, no matter how smoothly accomplished, is not, strictly speaking, a comfortable one for the passengers, and know that it is very fatiguing for the driver, increasing greatly the strain of guiding the vehicle.

#### Unsprung Weight

As the weight of the axle and springs is on the average about one-quarter of the total weight, these parts are able to cause considerable disturbance in the smooth operation of the vehicle. This fact is, of course, so generally appreciated that many serious endeavors are made to reduce appreciably the weight of these unsprung parts and by so doing decrease the effect of their action and reaction. These efforts undoubtedly have good effect when they are carried far enough to make an appreciable change in the proportion of sprung and unsprung weight.

The pneumatic tire is one of the main factors in the success of the passenger automobile. If this tire is such a good thing, why not have a little more of it? Why not give it a larger opportunity to show its worth and itself absorb a larger proportion of the shocks, and give better traction?

In fact it is perfectly possible to carry this idea far enough to eliminate the springs entirely and simply provide for the horizontal displacement of the front wheels with relation to the rear pair. When this is done the unsprung weight factor will have disappeared, as all the weight is sprung weight and completely tied together without movement. The wheels move with the body and the body with the wheels.

At present we seem to be accepting as gospel the statement that the present tire sizes as put forward are the last word as regards pneumatic-tire equipment, when a little thought and even less science can prove them as only the beginning of the real use of pneumatic tires.

Mr. Crane said he was glad Mr. Putnam had put so much emphasis on the tire problem. The fabric tire was inherently a shock absorber, and that was the reason of its shortness of life; it absorbed the energy of the shocks and that destroyed it. The tire companies in their literature had not taken full advantage of the possibilities of the cord tire.

#### Mechanical Losses

Next was read a paper entitled: "Mechanical Losses an Economy Factor," by Prof. Wm. T. Magruder of Ohio State University. Prof. Magruder said that tests of engines and materials had become common, and that greater attention must now be given to the smaller parts of the motor car. We could hardly expect private laboratories to make public the results which they had obtained at great effort and expense, and the general public must look for such information to the Bureau of Standards and to the several engineering laboratories conducted in connection with state universities and other institutions. Figures were given for the friction horsepower of the Ford engine at normal speed, and this was said to be approximately equal to the power required to drive an automobile at moderate speeds. How to reduce this friction horsepower was a problem that called for experimental investigation. The temperature of the jacket water had an important influence on the operation and economy of an engine. Intense cooling increased the power and reduced the specific fuel consumption, both with gasoline and kerosene. Prof. Magruder described the testing facilities at Ohio State University, and some of the methods followed in making power and



efficiency tests of engines, transmissions and complete chassis.

W. P. Kennedy presented a brief note descriptive of three light German cars, on behalf of Col. A. J. Slade, who was a member of the U. S. Armistice Commission and who, upon his return to the United States, brought along samples of the cars referred to, a Benz, a Wanderer and a Mathis. Recently experiments had been conducted with these cars to see whether a car of the Wanderer type, for instance, would not be more economical to maintain than heavy motorcycles in the mail service. Mr. Kennedy said that in case the design should be found suitable, it would have to be somewhat Americanized by increasing the tread from 48 to 56 in. and by making various parts more accessible so as to facilitate repairs.

C. W. Spicer presented a paper on Torsional Strength of Multiple Splined Shafts. Tests were run on 15 carefully machined shafts, of the dimensions shown in Fig. 1, there being not more than 0.0005 in variation from the diameters shown. The shafts were carefully heat treated, each specimen being checked by Brinell tests at the ends and by scleroscope tests throughout its length, the Brinell hardness lying between 220 and 235 and the scleroscope hardness between 38 and 43.

It will be noticed that the small diameter of shafts Nos. 11 to 15 lies between the large and the small diameters of shafts Nos. 6 to 10. This diameter represents a shaft which, according to one authority, is hypothetically equivalent to the splined shaft in torsional strength. Mr. Spicer's tests disproved this assertion.

The results of individual tests of the five specimens of each group were very uniform. The curves shown in Fig. 2 represent the average of the five shafts in each group, and are self-explanatory. Curve A is the plotted average of shafts Nos. 1 to 5. Curve B is curve A corrected for a diameter equal to the small diameter of shafts Nos. 6 to 10. Curve C is the average of shafts Nos. 6 to 10, and curve D is the average of shafts Nos. 11 to 15.

The position of the letters a, c, d also indicates the location of the so-called Johnson elastic limit; that is, the point at which the unit increment of deflection per unit of load increase is 50 per cent greater than at the beginning.

Comparing curves B and C it will be readily seen that a splined shaft of the dimensions given has a torsional

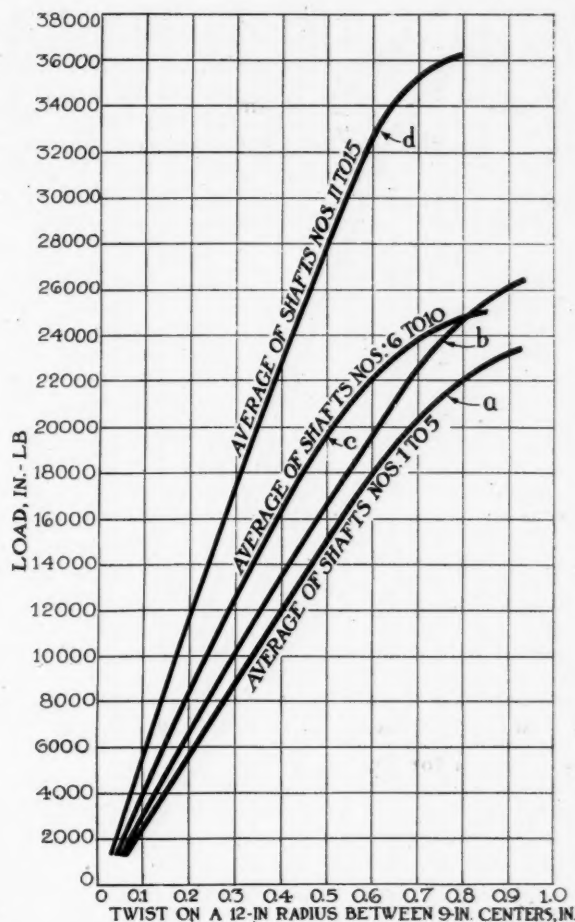


Fig. 2—Curves showing results of splined shaft tests

elastic limit of approximately 18 per cent less than a full round shaft of a diameter equal to the small diameter of the splined shaft. The elastic limit of the hypothetically equivalent shaft is very much higher.

A paper on a New Principle of Engine Suspension was presented by S. E. Slocum, Professor of Applied Mechanics at the University of Cincinnati. The method referred to consists in mounting the engine or powerplant upon a sub-frame or cradle, which is rigidly supported upon a trunnion at the middle of a cross member of the frame at one end, and resiliently supported on the main frame on both sides at the opposite end. Prof. Slocum said that most of the vibration in a motor car was due to synchronism between the natural period of vibration of the complete chassis and the operating speed of the engine. By mounting the engine as described, it would not only have a three point support, but within certain limits it would have freedom of motion about a fixed point. The engine had three degrees of freedom and it was possible to absolutely control the period of vibration. By properly designing or adjusting the resilient supports, which were shown in the form of coiled springs, it was possible to change the period of vibration so as to prevent any possibility of its synchronizing with the natural period of the chassis.

J. G. Perrin, who had been abroad recently, attending the London show, spoke briefly on light cars in Europe. He voiced the opinion that we did not have very much to learn from European engineers in the matter of securing economy. Abroad they obtained economy by using very small cars, which would not be practical here, at least not so long as we failed to get over our mania of doing everything on the high gear. They secured light weight by making their cars small. They used smaller

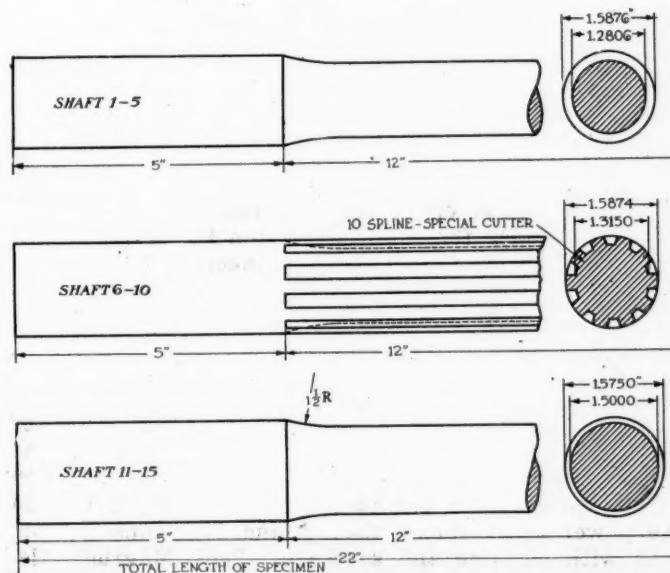


Fig. 1—Dimensions of test pieces used in splined shaft torsion tests

gear ratios, and we all knew that that made for fuel economy. The only example of advanced design that he saw was the Ricardo engine, which he described briefly. All the small cars being brought out in England had engines of only 11 to 12 h.p., and one reason for this low power was that the British Government had recently imposed a tax of one pound sterling per horsepower. In judging European fuel economy figures, it must be kept in mind that they are based on a somewhat better grade of gasoline than we were using, and, of course, it must also not be lost sight of that the Imperial gallon is considerably bigger than the U. S. gallon.

One speaker said that he had had experience in France with both the Wanderer and the Baby Peugeot. Both of these cars were equipped with 4-cylinder, 60 x 90 mm. (2.36 x 3.54) engines. The one original feature on the Wanderer was a transmission case of pressed steel. On the whole the Baby Peugeot showed much the better performance. On one occasion he drove it at an average speed of 28 m.p.h. continuously for over 2 hrs., with a fuel consumption of 7 liters per 100 kilometers, which is equivalent to nearly 34 miles per gal. Both the Wanderer and the Baby Peugeot were magneto-equipped. The Wanderer had a silent camshaft drive, while the Peugeot had a direct drive on both the second and third speeds, the second speed reduction being 7 to 1 and the third speed, 3½ to 1. Both of these cars weighed in the neighborhood of 1300 lb.

#### Efficiency of Pneumatic Tires

Mr. Manly asked Mr. Vincent what was the actual efficiency of the pneumatic tire. When the A. C. A. erected its clubhouse it installed a chassis testing dynamometer in its laboratory, and tests made on this dynamometer showed that a great amount of power was lost in the tires. In the case of one particular car, this loss amounted to from 36 to 45 h.p., and the results were very disappointing to the manufacturer. Mr. Manly said his reason for bringing up this matter was because in 1896 he had made some tests on the efficiency of bicycle tires in collaboration with Prof. Carpenter at Cornell University, and these tests indicated very low efficiency, the efficiency, moreover, being in inverse proportion to the wall thickness. Mr. Clayden said that the testing apparatus formerly installed in the A. C. A. laboratory had been transferred to Yale University, New Haven, Conn., and was now in charge of Prof. Lockwood, who had given some figures regarding the losses in pneumatic tires in a paper presented before the Philadelphia Section of the Society.

Mr. Manly said one thing he wanted to bring out was that a tire was very much more efficient when highly inflated, to which Mr. Crane replied that the efficiency also depended upon the flexibility of the casing. The power loss in cord tires varied between 20 and 30 per cent, while that in fabric tires amounted to considerably more.

Mr. Williams said it would appear, now that cord tires had come into extensive use, that it ought to be possible to make tires very much larger in width and with thinner walls, and at the same time use lower inflation pressures. Mr. Anglada said that if springs were to be dispensed with, it would be necessary to use pneumatic tires about 12 in. in width. In Buffalo recently he had seen a 12-in. tire on a motor truck burst, and the truck turn over as a result, and the same would undoubtedly happen if tires of such size were fitted to passenger cars.

F. E. Watts said that the published results of the French fuel economy contest showed that whereas the French cars were groomed to the highest pitch and handled with great skill, the American cars were poorly

handled. He thought if the American cars had received treatment equal to the French, they could have done substantially as well. The French were getting more miles, but not more ton miles per gallon.

O. A. Malychevitch said that one difference between French and American practice was that, whereas in this country cars were generally completely designed by factory engineers, in France many cars were designed by independent engineers. After the design of the car was completed, it was passed on to the factory production specialists, who then worked out the production problems. This, he said, was one reason for the better economy of the French cars. H. M. Crane pointed out that an economy contest, as usually conducted, was a very inconclusive affair, for the reason that many expedients were resorted to in order to reduce the consumption that the ordinary driver would never think of in regular use. He mentioned particularly one car with which he was familiar, which won an economy contest some years ago. This had a special rear axle reduction of 1½ to 1, was equipped with silk cord racing sulky tires, was lubricated throughout with light machine oil, had a special high compression engine, and was lightened in many ways.

#### Low Mechanical Efficiency at Low Loads

H. L. Horning dwelt on the low mechanical efficiency of the gasoline engine at the loads usually carried in car operation. He said that the friction between the piston and the cylinder walls accounted in many cases for 50 per cent of the indicated horsepower, and he felt that there was much opportunity for reducing this loss of energy.

Prof. Berry said he would not like to have the idea spread that economy contests are of no value. He would like to see the S. A. E. or some other body hold a yearly contest of that kind, and to make it of practical value, the rules should be so drawn that it would be required to meet certain performance requirements before the economy contest, and let the adjustment of the car remain the same. H. M. Crane said he hoped Prof. Berry's suggestion would be taken up by the proper people and a suitable set of rules be worked out.

Mr. Wolf asked Dr. Slocum why the fixed point in the new chassis suspension described in his paper was located at the rear end of the engine. The answer was that in most cars already built it was easiest to place it at the rear end, but in new cars it could be placed at the front end just as well.

#### Hydraulic Transmissions

Mr. Davids wanted to know whether the difficult gear changing, to which reference had been made in one of the papers, could not be overcome by the adoption of hydraulic transmission. Mr. Williams said he knew of one hydraulic transmission which originated in Minneapolis some 15 years ago, which showed a loss on the testing stand of only 15 per cent. It was then brought East and an attempt was made to apply it to automobiles, but it was found that the oil heated and when metal particles got into the oil they caused much wear. Mr. Manly said he had had experience with hydraulic transmissions extending over a long period, and that such transmissions were successfully used for operating gun turrets on battleships, in which service they proved very efficient. He did not expect to see hydraulic transmissions applied to passenger cars, as they were too heavy, but for commercial vehicles they were giving satisfactory results.

A paper by D. McCall White, on Modern Chassis Construction, could not be presented, owing to the absence of the author and the lateness of the hour.



# The Aeronautic Engineering Session

By J. Edward Schipper

**C**OMMERCIAL aviation is about as highly developed as the art of aviation, if the impression conveyed by the aeronautic engineering session of the Winter S. A. E. meeting is correct. We are about to witness the dawn of some highly important developments in the art due to the discovery of new thick wing sections which offer great structural as well as aerodynamic advantages. Because of the high lift-drift ratio of these new sections it will be possible to carry greater loads on lighter weight planes with smaller engines, and consequently to operate at higher efficiency.

From a development standpoint the engine is ahead of the plane. In fact, from the opinions of those presenting papers at this session it is unnecessary—or at least should be unnecessary—to use the highly refined products for commercial aviation that we used during the war. Grover C. Loening stated in his talk that commercial aviation had been set back more than ahead by the war time developments. It is the general consensus of opinion that it should be unnecessary to use engines weighing around 2 lb. to the horsepower, and that engines of from 3 to 5 lb. per horsepower are sufficiently light with the new wing developments, the additional weight in the engine going into reliability, endurance and economy in manufacture.

F. W. Caldwell, who spoke on propellers, told of some very interesting and important developments in new propeller materials. The bakelite propeller in his opinion is about the most valuable type that we now have on account of its freedom from the bad effects of weather and its ability to resist chipping in striking rain. He also spoke very favorably in regard to some of the specially constructed steel designs which have been recently put out. Like other propeller men he was enthusiastic over the prospects opened up by the reversible propeller both for military and commercial purposes.

For commercial purposes it makes it possible to use planes that have high landing speeds, the retarding effect of the propeller being sufficient to check the run of the plane after alighting in a very short distance. This,

of course, permits the use of machines for commercial purposes which have very high air speeds, making them more economical of operation, capable of carrying greater loads per engine horsepower besides being a factor in the saving of time for transporting freight and passengers. For military use, the reversible propeller opens up the possibilities of a great many new maneuvers outside of being able to land in restricted fields or, in the case of the navy, on ship deck platforms.

C. D. Hanscom presented a highly technical paper on the subject of airplane wings, dealing with some of the new sections which have recently been worked out in the various laboratories. He stated that the possibilities of thick wing development have not even reached their infancy. He showed a number of slides of the new wing sections, the best having an L/D of 14.2. In the discussion, however, a section was mentioned without any details being disclosed with an L/D of 21.8.

Speaking of front and rear flaps, Hanscom stated that they were not of great benefit except at high speeds. He said that the U. S. A-27 section with a 10 deg. flap at the leading edge and 5 deg. at the trailing edge gives very good results at high velocities. A point which was made very apparent in his talk is that a slight modification of the wing curve causes tremendous variations in the characteristics. This was brought out graphically in several instances by showing the wide variation in characteristic curves due to very slight changes in section contour.

Major T. H. Bane was unable to be present, but a résumé of military progress was given by a brother officer. This consisted practically entirely of slides and some very interesting moving pictures of the latest army parachute developments. An astonishing number of jumps have been made without accident, and from the examples shown no difficulty whatever is being experienced in making successful descents. Fireproof gasoline tanks covered with a coat of live rubber are being worked on and are giving promise of very successful results in preventing leaks from holes made by the various kinds of ammunition now in use.

## The Commercial Aviation Session

By Herbert Chase

**G**LENN L. MARTIN presided at the commercial aviation session and presented the first paper. He spoke of the progress of aviation in Europe, mentioning in particular the regularity of the Paris-London service, which has been carried on during the past year with only four interruptions chargeable to defects in the machines. He cited also the efficiency of the forest patrol, in which aircraft have been used to splendid advantage. He called attention to the fact that the modern plane will fly in any weather, fog and darkness being the only hazards not yet completely overcome. He urged the construction of more air terminals and favored the Federal control of aircraft, including licensing of pilots, inspection, etc. He stated that stunting over cities and other flying, except at sufficient altitude, to enable reasonable certainty of safe landing in case of engine trouble, should be prohibited.

The paper on "Commercial Aviation in Europe," by

Professor E. P. Warner, was an extensive review of the aeronautic situation in Europe. He contrasted the encouragement given aviation by the British, French, German and other European nations with the lack of such encouragement given by the United States Government. He stated that the airship has been proven more feasible for extremely long runs than the heavier-than-air type, but that the latter is very extensively and regularly used for mail and passenger carrying even over very long distances. As a rule, it is advisable to provide for regular landings at least once in each 250 miles. The fare from London to Paris is now about \$36, or 15 cents per mile, and will probably be materially reduced in the near future.

Both England and France are laying extensive plans for using aircraft as a means for binding their respective empires together. England maintains an extensive ground organization, flying fields, issues weather reports and

warnings, and assists designers by extensive research work, engineering conferences, and competitions intended to develop new types.

The author predicted the development of large machines in which six to eight engines will be used, these being so arranged that individual engines can be stopped and repaired en route when this becomes necessary.

Ralph H. Upson presented a paper entitled "Transportation of the Immediate Future," in which he analyzed the economics of aircraft operation by means of charts which were explained in detail. This paper was followed by an informal talk by Major Lent of the U. S. Aircraft Mail Service. He stated that the cost of operation of the DH4 machines, being used by the Government, is approximately 70 cents a mile, and that this figure can be reduced to one-half by the use of machines especially designed for the purpose. The DH4 machine is equipped with a 400-hp. Liberty engine and carries only 400 lb.

of mail, while it is possible to carry 1000 lb. in a machine equipped with a 200-hp. engine. Major Lent regards the multiple engined plane as necessary only as a means of avoiding an emergency landing. He prefers the use of a number of small planes in preference to one large machine for the reason that if the latter type fails in a given trip, the service is 100 per cent interrupted, whereas if four machines are used for the same service, it will seldom prove impossible for less than three to make a given trip. Hence the service will almost invariably be at least 75 per cent perfect. It is important to improve the reliability of aircraft, and to provide definite location finders in order that machines can fly above the clouds in case bad weather is encountered.

The session was concluded with a paper by S. W. Sparrow of the Bureau of Standards, the purpose of which was to show the effect of variations in compression pressures on engine performance.

## Standardization and Co-operation Features of S. A. E. Body Session

By Norman G. Shidie

**T**HE beginning of serious efforts at body standardization was the feature of chief importance which transpired at the body engineering session, while the need for better co-operation between chassis and body engineers was emphasized. The use of plywood, the training of competent workmen and the trend in body styles also came in for discussion.

Although the matter of body standardization was treated only briefly, an exceptional amount of interest attached to the discussion, and several very earnest pleas were voiced for action of some kind. One speaker, during the discussion, very emphatically declared the need for S. A. E. body standards to be vital since body men were now compelled to rely upon the standards set up by the manufacturers of the various products. He cited aluminum, cotton batting, and lumber as examples of materials for which standard specifications are necessary. He declared that trade names were used as a substitute for standards, so that it was, consequently, impossible to determine what sort of material was actually being bought.

The only paper which referred directly to this phase of body work was that of Kingston Forbes. Though discussing this subject very briefly, Mr. Forbes did make some concrete suggestions as to factors upon which work might be started. Some of the items suggested by Mr. Forbes which could be seriously considered for standardization are as follows:

1. Lumber specifications.
2. Cushion spring wire.
3. Fabricated cotton hair and burlap.
4. Imitation leather.
5. Top materials.
6. Webbing.
7. Closed body and windshield glass.
8. Automobile hardware.
9. Body bolts.
10. Curtain fasteners.
11. Bow sockets.
12. Top hardware.
13. Bow-bendings.
14. Back curtain lights.
15. Door handles.

Discussing the future of body standardization, David Beecroft, the new President, stated that a Body Standards Committee would probably be appointed and that he felt that definite action would be started along this line at once. He said, however, that he was unable to indicate exactly the direction which would be taken immediately by this work.

It would appear certain, however, from the discussion in regard to body standards, that there is a definite need for activity in this direction and that such activity is to be expected at once.

### Co-operation with Chassis Engineers

Nearly every speaker, both those who read papers and those who entered the discussion, emphasized the need for closer co-operation between the body and chassis engineers. It was felt that very often the chassis engineer was allowed to complete his work according to his own ideas and that the body engineer was compelled to build a body to fit the conditions imposed by that chassis regardless of the possibility of doing so successfully.

The necessity for such co-operation was strongly urged by Charles A. Heergist in his paper on "Can Automobile Body Weight Be Reduced?" which was read by A. P. Cardwell. He brought up the question as to whether the chassis should be designed strongly enough to carry the entire weight or whether the body should be required to carry a large share. He stated that "if the metal frame sags, as the body is screwed to the metal frame, it carries the body with it at every downward movement; consequently the carrying capacity of the frame should be proportioned to the number and weight of the passengers, and the body built as light as is consistent with stability."

Such problems as these inevitably require close co-operation between chassis and body builders, since it is impossible for the latter to do his best work if he is forced to meet predetermined conditions.

George Kerr, body plant manager, Mitchell Motor Co., contributed some very valuable suggestions in discussing this phase of the subject. He cited an instance of a body concern which was building an almost exactly similar body for two different automobiles. Great trouble was being



experienced in connection with one of these machines, complaints coming in constantly that the bodies were shaking to pieces very rapidly and were giving very poor service.

Mr. Kerr believes that a four-point engine support reduces very greatly the wear and tear on a body as opposed to the three-point support, and in investigating the reasons for the difference in performance in these two cases, he immediately looked for this feature. He found that the car on which the bodies were giving such poor service had a three-point engine support and that the car on which they were giving good service had a four-point support. To this difference could be traced the variation in performance between the two makes.

The three-point engine support reduces vibration on the engine, but increases it on the body. Mr. Kerr pointed this out as an instance of what may be lost by lack of co-operation between body and chassis designers. When each one works according to his own ideas, the resulting job is not the best that might be turned out and the result is likely to be a "passing-the-buck" between body and chassis designers.

#### Uses of Plywood

Considerable discussion centered about the possibility of using plywood or laminated wood in bodies as a means of reducing weight. While various difficulties had been experienced by the different speakers, nearly every one agreed that there was some difficulty great enough to render it impracticable for production use.

#### Accurate Workmanship Difficult to Obtain

One of the chief difficulties in body work appears to be that of getting workmen to accurately carry out the ideas of the body designer. It was felt that the training of men capable of doing good body work was one of the big problems of the body designer or manufacturer.

Many times it has been impossible to get the drawing of the body engineer visualized in concrete form by the foremen and workmen who are responsible for the actual manufacture of the product.

#### Trend in Body Design

The trend in body design is toward a design that will please the majority of people, and because of quantity production needs inclines toward a reduction in the number of models offered by each manufacturer. This is the opinion expressed by George J. Mercer in his paper on "Style in Automobile Bodies."

"The number of different body models that will prevail during the coming season," Mr. Mercer said in part, "is less than in past years. For example, a few seasons ago one manufacturer listed 14 body styles that were in regular production. The greatest number of models listed by one manufacturer during the past year was eight; the majority listed four and this latter number probably will be the number of different models made by most manufacturers in the coming period or, if the touring car is considered, in two divisions, a total of five styles.

"The models that will prevail during the coming year are the five-passenger touring car, the two-passenger run-about, the five-passenger sedan and the four-passenger coupe. The seven-passenger touring car and the seven-passenger sedan will be made in limited numbers; at times the latter will be built with a division, thus making it a two-compartment car. The touring body, that has remained stationary for so long as regards development, is surely developing into two divisions to meet existing needs. . . .

"The four-door sedan as we have it today comes nearer to meeting with universal approval than any body design that has ever been introduced. It has superseded all other forms of closed body for general use except the coupe,

which finds favor because it is a miniature of the four-door sedan. The sedan has been simplified in construction by using belt molding that runs all the way around, and the same condition exists at the drip. These two moldings eliminate the welding of the panel. The drip molding covers the top material edge effectively or at least permits the use of a small corner molding under which the top cloth is finished, without its being evident.

"While there is a general tone of simplicity, the tendency is to make up in quality what is lacking in variety. It is reasonable to believe that this will be the prevailing spirit for the season to come. The automobile body is so well known, so generally used and so thoroughly understood by the public, that its intrinsic worth is becoming its best advertisement.

"Builders of the more expensive cars will always make their product of an approximately special-to-order class, Purchasers who are able to buy without counting the cost insist on body designs that are uncommon. Those who produce cars in large numbers for this class of trade usually follow a design that is not extreme, and that relies for its attractiveness upon the fine quality of the workmanship and the high quality of the material used. The chauffeur-driven car is the rule. The limousine and two-compartment sedan will prevail, with the town limousine, the town brougham and the cabriolet as the types having the lighter bodies."

Mr. Mercer also pointed out that there is a return to the type of body lines that preceded the prevailing style; that is, the straight line with angular corners is giving way to moderately rounded surfaces. At the same time, however, the straight line effect is being preserved to a large extent.

#### Production of All Metal Body

An interesting paper on "Passenger-Automobile Body-Designing Problems" was presented by Andrew F. Johnson.

George E. Goddard, of the Dodge company, presented an extremely interesting motion picture showing the methods used in manufacturing the Dodge all-metal body. He stated that it would take six months to make the dies necessary for this job and that a minimum production of 100 a day was necessary to render the process economical. The dies will last from four to five years.

In his paper on "The Body Engineer and His Relation to the Industry," Kingston Forbes divided the body engineer's task into two parts: artistic and mechanical. In the designing of custom-made bodies, he said, the artistic side is probably the most important, but he pointed out that in quantity production especially art had to be satisfied by dies and stamping machines.

The body engineer, according to Mr. Forbes, should be familiar with all the various trades which go to make up the finished body. While it is difficult for him to obtain this knowledge, he should obtain as much of it as possible. In this connection, the work of the body engineer might be divided into six divisions:

1. Body construction, open and closed.
2. Sheet metal, body metal, fenders, hood, radiators, etc.
3. Trimming.
4. Top building.
5. General hardware.
6. Painting and enameling.

This was the first session devoted entirely to body engineering ever held by the S. A. E. and over one hundred men attended. The discussion developed many interesting ideas, and an intense interest was manifested in the several questions mentioned previously. The meeting was in every way successful. It should pave the way to new achievement in the field of body engineering and help promote co-operation between chassis and body designers.

# The Highway Session

By Clyde Jennings

**T**HE first S. A. E. highway section meeting was instructive, interesting and, finally, entertaining. It was quite well attended, there being at one time fifty persons in the room and the total attendance reached a much higher figure. The attendance included a number of automotive engineers, several truck manufacturers and a considerable number of men who make highway work a chief factor in their every day affairs.

Col. H. W. Alden presided, and in his opening remarks called attention to a marked difference between the development in automotive and other means of communication. He said that in the case of the railroads, telephone and telegraph, the means of communication had been entirely within the custody of the persons who were responsible for the development of the theory. In automotive communication, men made the vehicles and then sent them out to run on a road that was outside of the control of the makers of the machine. The development of the means of communication had been everybody's business and, consequently, was not well attended to.

## Responsibility of Automotive Engineer

The time had come, said Col. Alden, when the highways must be developed and the automotive engineer could not longer afford to neglect this problem. He called attention to the fact that the engineering schools had not developed a sufficient number of engineers to handle the great amount of work that is now called for.

Referring to the responsibility of the automotive engineers, he said:

"Merchandise transportation depends not only on cars and roadbeds, automobiles and highways, boats and waterways and, I might add for the future, airplanes and blue sky, but on the manner of use of these agencies. Here again we can learn a lesson from railroad experience. In the past the development of freight terminals and rail transportation has been under the same general guidance and the development of the two has been consistent and logical. The recent projection of the automobile into the transportation field has made possible wonderful changes in the methods of distribution of all commodities, but here again the automotive industry, as a whole, has neglected its full responsibility.

"It has failed to shoulder this responsibility for the correct use of the new instrument which it has produced, and for the proper correlation of it with previously existing instruments. I believe we are emerging gradually from our fools' paradise of money-making into a realization of this larger responsibility. How the railroads, highways and waterways can be best joined together in the general function of merchandise transportation is worthy of any man's time and intensive study. The correct solution and the proper arrangement of these three agencies will have a wonderful effect on the future of our industry.

"Freight cars average little better than 25 miles per day, due to terminal delays which could be eliminated largely if the motor trucks and railroads were in proper relation. This daily average could be lifted easily to 75 or 100 miles if the inefficiency of present terminal methods were eliminated. This is no idle dream. The basic trouble is that railroads are doing an enormous amount of less-than-carload, short-haul work for which they are not so well equipped as is the motor truck. The average distance that each ton of freight is hauled by rail is less than 200 miles, due to this large amount of short-haul tonnage.

"A proper re-arrangement wherein the motor truck would do the short-haul and the less-than-carload work and the railroads the long-haul work would give us a regular freight transportation more speedy than to-day's average express shipments and at a cost far less than anything dreamed of to-day. However, I have seen little indication of study of this problem by the automotive industry as a whole, or of co-operation with the railroads in its solution, until very recently. We cannot pass the blame on to the railroads.

"The responsibility is our own. It is a challenge to the brains of the automotive industry and, unless we get busy and assist in the solution of this problem, the progress of the truck industry will be slow where it might be rapid. The details of these questions are numerous, but they are not difficult of solution. They must, however, be honestly faced and understood. Then, if honestly attacked, the results will revolutionize our transportation business.

"I am fairly well acquainted with what our industry has done in the fields of highway development and merchandise transportation, but I repeat that what has been done is only a drop in the bucket. I am greatly pleased that our Society is showing signs of life in these two directions, as they are at the very foundation of our future success and expansion. It behooves every automotive engineer to devote a goodly share of his time to studying these two questions. I hope what I have said will direct our attention more and more to these fundamental problems, the solution of which is as much our responsibility as it is that of the railroad and highway engineers."

## Bureau of Roads Tests

A. T. Goldbeck, engineer of tests of the U. S. Bureau of Roads, showed many lantern slides concerning the research and experimental work of the Bureau. In showing these slides, which were photographs of the equipment for the experiments, the operations and of curves of deduction, he asked that those present do not accept the figures given as final as to detail. He said that the Bureau was checking the data gathered and shortly would issue a bulletin in which much of this data would be compiled. In the meantime he asked that his talk be construed as merely a progress report. His talk was especially interesting as to determining the weight distribution on the wheels of the vehicles by means of the device which is buried in the soil under the surface of the road. Thin brass sheets are arranged to measure the slightest change of pressure in the subsoil through the breaking of the electrical circuit. This device has supplied new data as to the extent of the pressure under the wheel of the truck. The change in pressure, of course, varies with the nature of the subsoil.

He also showed the experimental bits of roads built with a view to determining to what extent moisture can be kept from the subsoil by waterproofing the shoulders of narrow surface roads. He showed the machinery and operations for determining the impact of trucks on a given set-off in the road surface. One rather peculiar feature developed in this experiment was that while there was a wide range of difference in impact in favor of a new solid tire as against the seriously worn solid tire, and again in favor of the pneumatic tire as against any solid tire, there was a comparatively slight range between the pneumatic with 160 lb. pressure and the pneumatic at 130 lb. This difference was much less marked than was expected.



This statement was subject to some discussion and Goldbeck explained that while the under-pressure pneumatic was regarded as a more comfortable tire for riding on a rough road, this was due to the time element entering into the impact.

Goldbeck, in summing up, said that with increasing loads he had become interested in the problem of distributing the load on more wheels. The parallel for this, he said, was in the railroad work. As the size and weight of locomotives increased, the number of wheels had been increased. He also said that the question as to the relative cost of the highways and the cost of the motor trucks that passed over it had been raised, and in his opinion the question of designing either the highway or the motor truck might ultimately be determined by economic considerations.

Later in the discussion, David Ludlum of the Autocar Co. asked Goldbeck how many types of trucks had been used in these experiments and how many would be used before the question as to the design of a truck was passed upon. Goldbeck in reply said that seven or eight designs had been employed, but that these experiments were for the purpose of determining highway research material and not with a view of deciding upon any truck design. In answer to another question by Ludlum, he said he would be quite glad for the opportunity of using a short wheelbase truck in the experiments. He passed the question as to the use of data gathered in these experiments in advertising certain trucks, by saying that so far only progress reports had been issued and that he would much prefer that no such reports be made. His idea was that the data should not be made public until completed, but that in government work it appeared to be necessary to issue reports from time to time, and that these reports were often mistaken for complete reports and so used. He could not stop this practice.

William E. Williams, a consulting engineer, read a paper on "Highway Road Construction," on experiences drafted chiefly from civil and railroad engineering. Williams expressed slight patience with much of the research work on highway problems, strongly favoring a brick and concrete road of sufficient thickness—10 in. appeared to be sufficient to him—to support the traffic. He said that if such a highway was made, there need not be much worry about the subsoil pressures and drainage. The paper was the sub-

ject of quite a number of comments in the discussion, in which many statements were disputed. Most of those present appeared to think that Williams had ignored the necessary question of cost.

H. E. Breed of the New York State Highway Department, in his paper on "Variable Factors That Influence Highway Design," made the political side of road building the prominent one. He favored a department that was not a part of the political booty. Political domination, he said, was one of the chief evils of the day.

Another variable factor of importance is the volume and character of the traffic of to-morrow. He said that he did not believe any engineer to-day faced this problem with confidence. He passed quickly over the other variables, which he said were foundation, surfacing, drainage and maintenance.

A. E. Masury showed two lantern slides of a device that he had built for measuring the effect of road jolts on the truck. The measurements are made on a paper cylinder by a pencil controlled by an air cylinder. The seismograph chart is timed and relative data can be obtained over the same roadway. This entire work, he said, was in a very experimental stage.

One of the highly interesting contributions to the discussion was that of State Highway Engineer Meeker of New Jersey. His view was that the greatest single factor in the highway problem was that of maintenance. The present tendency was to build a highway—good, bad or indifferent—and then forget it until it was necessary to build it over. It would be well, he said, to follow the railroad practice, where regularly section gangs were responsible for certain mileage of track. Highways needed repair men constantly on the job, they needed track walkers, they needed renovations and general repairs in the fall and spring; the first to prepare for winter and the second to repair the damage of winter. With this sort of treatment, Meeker said, many types of highways now condemned would stand the heavy traffic wear. Others who participated in the discussion were David Fenner, Cornelius Meyers, S. M. Williams, H. W. Slauson.

In adjourning the session Chairman Alden said that he understood that it was the plan to hold future sessions of this nature, and while this had been strictly a highway session, he thought that future meetings would be based on a consideration of the general subject of transportation.

## The Standards Committee Meeting

By P. M. Heldt

THE Standards Committee met on Tuesday morning at the Engineering Societies Building, Chairman B. B. Bachman presiding. The first report presented was that of the Aeronautic Division, by H. M. Crane. It proposed a revision of the tables of turnbuckle dimensions, to bring the S. A. E. specifications in line with the specifications of the Bureau of Aircraft Production. In the discussion, an exception was taken to the wording of one recommendation, that the barrels should be made "of naval brass or an equivalent alloy." This brass is equivalent to S. A. E. non-ferrous alloy No. 73 and it was held to be more fitting to use the latter term. The suggestion to substitute this term was put in the form of an amendment, which was carried, and the part of the report dealing with turnbuckles itself was then adopted. J. L. Hartness said that the turnbuckles covered by the table were good for cables up to  $\frac{1}{4}$  in. diameter, and since we were now getting into larger sizes of aircraft, it would be well to extend the table to include turnbuckles suitable for  $\frac{5}{16}$  in. cable at least.

The suggestion was brought to the attention of the Aeronautic Division.

### Federal Aircraft Registrations

The second part of the Aeronautic Division report was in the form of a special report on the regulation of commercial air navigation. Mr. Crane said that there was every evidence that legislation would soon be adopted by various states seriously restricting the use of aircraft, and that it was highly important for the S. A. E., which was an organization endeavoring to encourage experimental development of aircraft, to see to it that no undue restrictions be placed on machines which had not yet proven absolutely safe, provided that the men who did the flying were cognizant of the risks they were taking. Mr. Crane said that this was not entirely in line with the usual work carried on by the Standards Committee, but that it was necessary to take action on the report for the guidance of the Sub-Division on Performance and Testing. The special

report read as follows:

"A system of Federal registration of all aircraft for identification, and in addition, licenses for certain specific purposes or uses should be adopted.

"All aircraft carrying passengers for any purpose, or goods in commercial service, should be licensed by the Federal authority, which license shall indicate the aircraft licensed has complied with certain minimum requirements as to safety. By passengers is meant any person not a necessary member of the crew.

"Any aircraft not coming under the classification in the previous paragraph may be licensed by the Federal authority even though not complying with the safety requirements, but only for restricted service with a view to minimizing danger to persons or property on the ground. This is intended to cover experiment and special racing aircraft as well as privately owned aircraft not used in commercial or Government service.

"Minimum requirements cannot, even as regards the structural strength, be reduced to rules and figures capable of application in inspection except by persons of adequate engineering training in this field, and other necessary minimum requirements regarding safety of operation are the result of compromise and can only be applied by persons with trained judgment.

"Any definite requirements or figures should not be written into legislation at this time, because these matters would be handled best by the regulation and ruling of the Federal authority which should be created by legislation.

"Aircraft, which, in accordance with previous paragraphs, require a license, should be periodically inspected to insure that they continue to be in a safe operating condition."

#### Ball and Roller Bearings

W. R. Strickland made the report of the Ball and Roller Bearings Division. The first item covered a proposed extension of the standard for angular contact ball bearings. It was recommended that the bore, outside diameter and eccentricity tolerances specified for light, medium and heavy series annular ball bearings, be adhered to for the angular contact type, and that the tolerances for the overall widths be specified with the footnote reading: "The width tolerances for the individual ring shall be the same as those for the corresponding sizes of annular ball bearings of the light, medium and heavy series." It was also recommended that the angular contact type bearing tables be published as separate and complete standards. The recommendation was adopted.

Under the heading of the separable (open) type, it was recommended to revise the present standard by changing the heading in the column "Width of individual ring" to "overall width," and to add tolerances of plus or minus 0.002 in. to the overall width dimension. A footnote is to be added, referring to overall width, to the effect that "The nominal width of individual rings shall be the same as for the overall width in the above table, but shall have tolerances of plus or minus 0.001 in. This was adopted.

It was further proposed to change the designation "extra wide type" to "wide type," to add a note to the effect that "The bore and outside diameters for wide type annular ball bearings shall be the same as for the corresponding size annular ball bearings in the light, medium and heavy series," and to add a footnote referring to the title, to read: "Normally these bearings are a double row type of construction." This was adopted.

#### Shaft and Housing Fits

Under the heading, "Shaft and Housing Fits and Tolerances for Ball Bearings," there were presented two tables which it was proposed to print in the S. A. E. Handbook

for general information only. These tables gave the nominal dimension, plus and minus tolerances of the inside diameter of the bearing, the shaft diameter, the outside diameter of the bearing and the housing bore. H. M. Crane thought that the information contained in the tables should be presented in a slightly different form. On steering knuckles, for instance, it would be commercially impossible to work to limits of 0.0005 in. He suggested that instead of giving the nominal diameter with plus and minus tolerances, on both the hole and shaft, only the extreme permissible differences between the shaft and hole sizes be specified. For instance, for the 30 mm. bore size of ball bearing, these figures would be 0.0002 in. looseness and 0.0009 in. tightness. It might be practical to work to a limit of 0.0005 in. in the manufacture of ball bearings, but it was not commercially practicable to work to such close limits in machining the bores of wheel hubs, for instance. Mr. Strickland explained that the figures in the tables were based on grinding fits, and he thought they were not as impossible as Mr. Crane suggested. These limits had been worked to by many manufacturers. In the larger sizes the tolerances were not of the order of 0.0005 in. but approached 0.002 in. Mr. Cookingham said he could not see how they were going to check such close dimensions, as a micrometer was absolutely unsuitable for checking dimensions given to the 10/10000 part of an inch, and very fine instruments would certainly be required. Mr. Scaife voiced the opinion that a looseness of 0.0002 in. would never do, because even with a ground surface, the bearings would soon begin to shake and give trouble, and with a machined surface it would be still worse. Mr. Gurney said that the limits which had been put into the tables were almost impossible, and that the only way to get the desired fit in most instances was by selection. Where this was impossible, the figures given might be used as a guide. Mr. Crane said he had had a great deal of experience in studying tolerances in connection with the manufacture of aircraft engines for the Government during the war, and that they had finally agreed on the system which he now proposed, which system was greatly appreciated by the shop men. Mr. Crane's amendment to present the dimensions in a somewhat different form was carried, and the report thus amended was adopted.

#### Electric Vehicle Battery Jars

The next report presented was that of the Electric Transportation Division, which related to electric vehicle storage battery parts, for passenger and commercial vehicles. The report was presented by E. L. Clark, and was merely a revision of an earlier standard. W. E. Holland suggested that in the two-ribbed type of jar, where the centers of the ribs were shown  $3\frac{1}{2}$  in. apart, this dimension be left off, as some of the jar manufacturers were making the ribs  $3\frac{1}{4}$  in. apart and it would be a very expensive matter for them to make this change, for which there was no particular reason. An amendment to this effect was carried, and then the whole report was adopted.

#### Lighting and Starting Batteries

Next the report of the Electrical Equipment Division was taken up, being presented by A. D. T. Libby. This division appointed a sub-division on storage batteries during the year 1919, to cooperate with the Bureau of Standards and the Motor Transport Corps in the formulation of specifications for starting and lighting storage batteries for military automobile and motor truck service, for the use of the Government, and to revise the present storage battery standards. Under the heading of "Rating" it was recommended that "Batteries for combined starting and lighting service shall have two ratings. The first rating shall indicate the lighting ability, and shall be the capacity



in ampere-hours when the battery is discharged continuously at the 5 hr. rate to a final voltage of not less than 1.7 per cell, the temperature of the battery beginning such discharge being 80 deg. Fahr. The second rating shall indicate the starting ability and shall be the capacity in ampere-hours when the battery is discharged continuously at the 20 min. rate to a final voltage of not less than 1.5 per cell, the temperature of the battery beginning the discharge being 80 deg. Fahr."

Under the heading of Terminal Posts, it was recommended that when taper posts are used for terminals of lead-acid storage batteries, the dimensions shall be  $\frac{5}{8}$  in. for the small diameter on the negative post,  $\frac{11}{16}$  in. for the small diameter of the positive post,  $\frac{11}{8}$  in. taper per foot, and  $\frac{11}{16}$  in. minimum length of taper. When straight terminal posts are used, the diameter of both the positive and negative posts shall be  $\frac{13}{16}$  in. and the minimum clear length of the post shall be  $\frac{13}{16}$  in. On the subject of terminal posts, there was a communication from Robert H. Combs, in which objection was raised to the decision to make the positive and negative posts of different diameters if they be tapered, but of the same diameter if they be straight. The explanation given was that straight terminal posts had never been made of different diameters, and since it was the object of the Standards Committee to simplify construction and reduce the number of different parts, it was not considered opportune to recommend straight posts of different diameters.

The principal changes from present practice recommended in the report may be summarized as follows: The report was specifically limited to lead-acid storage batteries, in order that the specifications would not be applied to Edison storage batteries. The S. A. E. Recommended Practice for posts for small cells was omitted, as the battery sizes proposed for adoption did not require the use of small terminal posts. The compartment height of 10 in. specified in the former S. A. E. standard for storage battery compartments was changed to  $10\frac{1}{8}$  in. The former S. A. E. standard for dimensions of lead-storage batteries for starting and lighting service was revised to specify a list of the sizes and capacities based on present practice, which was considered comprehensive enough for practically all commercial requirements. The former S. A. E. standard for ratings of lead-storage batteries for starting and lighting service was revised to conform to acceptable commercial practice.

The specification regarding fuel capacity was changed, the following passage being deleted: "With a current 25 per cent greater than the rating, the fuse shall open the circuit without reaching a temperature which will injure the fuse tube or terminals of the fuse block." It was recommended that the fuse clip and fuse ferrule should be nickel plated and that the fuses should be tested in both the vertical and horizontal positions. This section of the report was adopted.

### Spark Plug Tests

Another section of the report dealt with spark plug tests. Last year the Division co-operated with the Motor Transport Corps in the establishment of a Government specification for the testing of spark plugs, and from this work were developed recommendations for commercial use. The recommendations were prepared by a sub-division, and tried out by making tests. The following was accepted as recommended practice in making spark plug tests:

"A sufficient number of sample spark plugs drawn at random from stock are to be furnished to equip at least two of the engines under consideration.

"The spark plugs submitted for test must conform in all important dimensions to the engine builder's drawings.

"Preignition and leakage tests are to be made in the fol-

lowing manner. An engine of the type for which the plugs are intended shall be equipped with a set of the spark plugs to be tested. The spark plug gaps shall be carefully adjusted with a suitable thickness gage to the desired dimension and these gaps shall not be disturbed throughout the tests. The engine shall then be coupled to a suitable dynamometer and the circulating water maintained at a temperature of not less than 40 deg. Fahr. or more than 60 deg. Fahr. The engine shall then be started up and as rapidly as possible brought to the speed corresponding to the maximum torque, the throttle and the spark adjusted for this condition, and the circulating water temperature brought up to a temperature of not less than 190 deg. Fahr. nor more than 210 deg. Fahr. as rapidly as possible and this temperature maintained for the remainder of the run. Torque and speed readings shall then be taken at 30-sec. intervals for a period of 15 min. Appreciable loss of torque or speed, missing or backfiring which can be attributed to the spark plugs, will be considered grounds for rejecting the spark plugs under test, provided the engine is of proved design and has previously demonstrated its ability to run steadily under these conditions. During this run, tests for gas leakage shall be made by covering all joints of the spark plugs with oil and inspecting for leaks.

"Following this 15-min. run at the speed corresponding to maximum torque, the engine shall be brought up to the speed corresponding to maximum horsepower and be held at this speed for not less than 5 min. Observations similar to the previous will be made during this run.

"Spark plugs shall also be subjected to road tests to determine how well they will function under normal service conditions.

"Spark plugs which have successfully passed the above tests will be considered satisfactory for use in so far as the following points are concerned:

- "(1) Breakage owing to sudden temperature changes.
- "(2) Liability to cause preignition.
- "(3) Leakage.
- "(4) Power performance.
- "(5) Permanance of gap.

"The following procedure for determining the relative susceptibility of the spark plugs under test to fouling is intended to serve merely as a guide in making such tests, since general engine influences and more particularly lubrication and carburetion conditions varying as they do in different makes of engine, prohibit the setting of one strictly standard method applicable to all engines.

"The engine equipped with the spark plugs under test shall be run on the dynamometer with the circulating water at not less than 40 deg. Fahr. nor more than 60 deg. Fahr. The inlet manifold shall be kept at as low a temperature as practicable, all heating means being disconnected so far as possible. The engine shall be run with no load and a wide open throttle, the speed being held down to between 1000 and 1500 r.p.m. by causing the carburetor to feed an abnormally rich mixture. The engine shall be run in this manner for 3 min., following which the carburetor adjustment shall be restored to standard condition and the load applied to hold the engine at a speed of about 1200 r.p.m. It is assumed that the torque which is to be expected of the engine under test at this speed, has been previously determined. At the end of 2 min. running after applying the load as above explained, the percentage of standard torque which the engine is capable of developing will be considered as a figure of merit for the spark plugs under test. For instance, if at the end of 2 min. operation under load following the "choked" run, the engine is capable of pulling its standard torque, the spark plugs shall be considered 100 per cent satisfactory in this regard. If, however, the engine pulls but one-half its regular torque, the figure of merit will be 50. These tests should be re-

peated a sufficient number of times to insure a consistent average result."

### Magneto Standards

Under the heading of Magneto Dimensions it was recommended that the present standard be extended to include small magnetos used on motorcycles and isolated electric lighting plants, these magnetos to have the same size taper as given in the present Recommended Practice for larger type motorcycle magnetos. This was adopted.

It was also recommended that on flexible disk magneto couplings "cups or a similar form of grip washers shall be used on the flange bolts on each side of the disk, to reinforce the material against tearing out." This recommendation was objected to by Fred W. Andrew, on the ground that the S. A. E., by standardizing features of flexible disk couplings for magnetos, and not standardizing other types of couplings, gave the impression that the flexible disk was the only type recommended for magneto use. The very fact that grip washers were recommended in the report showed that this coupling as now used gave trouble, and since there were other types of couplings, it was suggested that the matter be referred back to the committee and that the present standard for flexible disk couplings for magnetos (covering diameter of disks and spacing of bolts) be eliminated from the records of the Society. It was voted to refer the matter back to the committee.

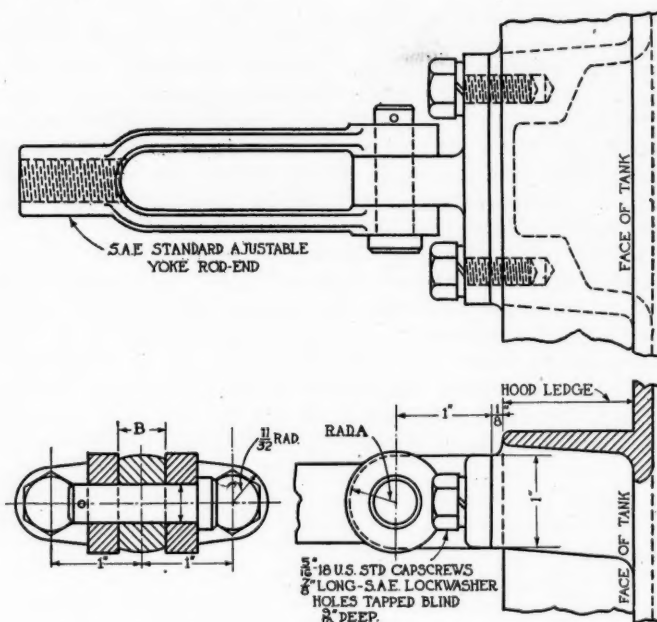
### Starter Pinions and Brushes

In connection with starting motor pinions it was recommended that the pitch-line clearance between pinion and flywheel, which is now specified as 0.015 in., should be specified as 0.015 to 0.025 in. After some discussion it was decided to substitute the phrase, "Clearance on the pitch-line," for pitch-line clearance, and thus amended the recommendation was accepted.

The Division had been requested to standardize commutator brushes for generators and starting motors, but found that the only thing that could be done at the present was to recommend the following: "All dimensions for brushes used in starting motors and lighting generators shall vary by even increments of 1/16 in. and the maximum tolerances from nominal size shall be plus 0.000 minus 0.010 in. for width and thickness and plus 0.000 minus 0.031 (1/32 in.) for length." This was adopted.

It was also recommended to delete from the records of the Society the following standard which had never come into practical use: "Before any electrical appliance is added to a gasoline car, as it is sent out from the car manufacturer's plant, a description of the said appliance should be submitted to the car manufacturer as to suitability for and the best method of application to the car." This was agreed to by the committee.

K. F. Walker presented the report of the Radiator Division. It was recommended that in cast radiators "inlet and



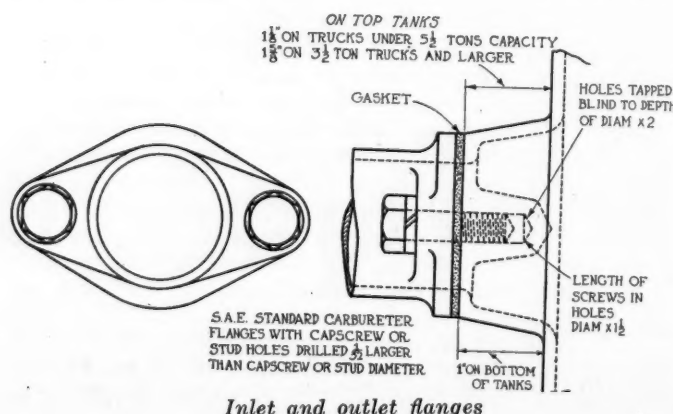
Cast radiator tie rod fittings

outlet fittings shall be cast separate from the radiator tank" and that they "shall be attached to the tank by flanges which conform to the present S. A. E. Standard two bolt type carburetor flanges of the 1, 1 1/4, 1 1/2, 1 3/4 and 2 in. sizes. The finished face of the pad cast on the radiator tank shall extend 1/8 in. outside of any other projection on the tank. The drilled holes in the fittings shall be 1/32 in. larger in diameter than the cap screw or stud diameter. The tapped holes in the pad on the tank shall be blind with a maximum tapped depth of twice the cap screw or stud diameter. The length of the cap screws or studs in the tapped hole shall be 1 1/2 times the diameter.

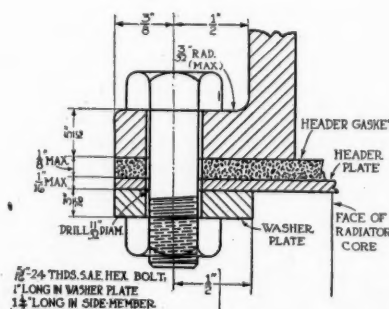
"In the tubular radiators, having internal overflow tubes, the tubes shall be of seamless brass or copper, attached to the bottom tank by a 1/2 in. American standard pipe thread brass plug. The jacket tube shall be 5/8 in. diameter and the overflow tube shall be 3/8 in. diameter.

"The size of the tapped hole for radiator drains shall be 3/8 in. American standard pipe thread. Bolt hole centers of header flanges shall be spaced 2 1/2 in. apart wherever possible. Cast radiator tanks shall be designed without ribs or cooling flanges. Tie rod fittings shall be in accordance with the illustration.

"A pressure of 5 lb. per sq. in. shall be used in making all tests for radiator leaks. Header plate widths shall be 5, 5 1/2, 6, 6 1/2 and 7 in. The hood ledges of cast radiators shall be 1 in. wide on motor trucks having a nominal capacity of less than 3 1/2 tons, and 1 1/2 in. wide on motor trucks having a nominal capacity of 3 1/2 tons or more."



Inlet and outlet flanges



Cast radiator header flange dimensions



In connection with passenger car radiators, the following recommendations were made: "The tie rods connecting the body (dashboard) and the top of the radiator shall be flexible. The hood ledge shall have a minimum width of  $\frac{7}{8}$  in. Hood lacing shall be not less than  $\frac{3}{8}$  in. wide, and not less than  $\frac{1}{8}$  in. thick." The whole report was adopted as presented.

S. P. Thatcher presented the report of the Tire and Rim Division. This contained only a single suggestion, namely, the extension of the present wood felloe dimensions standard for pneumatic tire rims, to include the 34 x 5 in. wood felloe having a width of 2 $\frac{1}{2}$  in. and a depth of 1 $\frac{5}{8}$  in., plus or minus 1/16 in. This was adopted.

#### New Non-Ferrous Alloy Specifications

J. J. Aull read the report of the Non-Ferrous Metals Division, which had revised all of its previous standards. This report included four specifications of white bearing metals or babbitts, Specifications Nos. 10, 11, 12 and 13. These were adopted as presented. Then there were four specifications of aluminum alloy, of which the first three were old and the last new. These specifications, Nos. 30, 31, 32 and 33, were accepted as presented. Next came eleven specifications of brasses and bronzes. One speaker said he regarded the requirement of 8 per cent elongation in specification No. 64 (phosphor bronze) as very high, as it was the practice of his firm to call for 4 per cent only. He was reassured, however, that the elongations requirements for specifications 64 and 65 were well within the limits of practical possibility. This set of specifications was adopted. Next No. 69 was taken up, which covers a new wrought aluminum bronze. This also was accepted. Specification No. 70, covering commercial brass sheets, embodies only a slight change, made to bring it into line with the A. S. T. M. Specifications. This was adopted. No. 71, covering copper sheet, was also adopted. Specifications Nos. 72, 73, 74 and 75 covered brass rod and tubing, and were adopted.

#### Tractor Belts and Governors

E. A. Johnston presented the report of the Tractor Division. In this it was recommended that belt pulleys and clutch diameters for new equipment should not be less than 12 in. and the pulley width should not be less than  $\frac{1}{2}$  in. wider than the belt required. Tractor drive belts for all purposes should be 5, 6, 7, 8 or 9 in. in width. This was adopted.

It was also recommended that farm tractors and engines intended for belt operation be equipped with a governor and so designed that a suitable speed indicated device might be attached. This was also adopted. On a previous occasion, the Society adopted a standard testing form for tractor engines. Mr. Johnston said that this had never come into practical use, and the Division wanted it eliminated from the standards of the Society. This was agreed to.

#### Screw Thread Standards

W. R. Strickland read the report of the Miscellaneous Division. This covered two items, namely, the proposal to adopt as an S. A. E. standard the American standard taper pipe thread, and a revision of the present S. A. E. oil and grease cup thread standards. At present taper threads are used in only a few of the S. A. E. Standards, namely, flared tube unions, ells and tees, fuel vacuum tanks, pipe flanges and oil and grease cups. In 1919, a committee of the A. S. M. E. held a public hearing for the consideration of international pipe threads, and following this hearing, the S. A. E. was requested to give official endorsement to the American standard taper pipe thread and to authorize an American representative in Europe to use the endorsement in propagating the standard among European manufac-

turers and technical organizations, prior to a contemplated international conference. It was decided to adopt the American standard taper pipe thread as an S. A. E. Standard.

In August, 1920, the Society adopted  $\frac{1}{4}$ -36 and 5/16-32 threads for oil and grease cups. There has been much criticism of this standard, for the reason that the common standard fine thread pitch for  $\frac{1}{4}$  in. diameter is 32. The Miscellaneous Division at this meeting, therefore, recommended the addition of a No. 10-32 size and to change the  $\frac{1}{4}$ -36 to  $\frac{1}{4}$ -32 thread. This recommendation was accepted.

#### Engine Division Report

In the absence of any members of the Engine Division, the report of that Division was read by Manager Burnett of the Standards Committee. In this report it was recommended that "mufflers shall vary in diameter and length by even inches, and shall be supported by bands extending around the circumference." In connection with flywheel housings, it was recommended that the following recommended practice be added to the present standard: "The clearance space for crankshaft flange bolts shall be 6 $\frac{1}{8}$  in. maximum diameter, and at least  $\frac{5}{8}$  in. deep." At the suggestion of the Truck Division, it was recommended to add two sizes to the present fan belt and pulley width standards, namely, belts 1 $\frac{3}{4}$  and 2 in. wide, and pulleys 2 and 2 $\frac{1}{4}$  in. wide, the limits on the belt widths being plus and minus 1/32 in. and the limits on the pulley widths plus and minus 0.005 in.

It was also proposed to standardize the air inlet openings of tractor carbureters so as to facilitate the fitting of air cleaners. The recommended practice is as follows: "The nominal diameter of the carbureter intake shall be the inside diameter, which shall vary in even quarter inches (from  $\frac{3}{4}$  to 4 in. diameter) so as to take standard tubing sizes as listed in the present S. A. E. Standard for Flexible Metal Tubing, page 35b, S. A. E. Handbook, Vol. 1. This also applies to the outlet of carbureter air cleaners, and similar devices wherever tubing is used." It was also recommended to cancel the present S. A. E. Recommended Practice for carbureter air heaters, as this practice had become obsolete. All of the recommendations of the Division were accepted.

#### Motorcycle Standards

Mr. Burnett also read the report of the Motorcycle Division. This included a recommendation for a slight change in the chemical composition of the steel for motorcycle spokes and nipples so as to make this specification identical with S. A. E. specification No. 1045. It also recommended a slight change in the specification of the steel used for motorcycle wheels and rims so as to make the latter identical with S. A. E. specification No. 1010. A further recommendation was to cancel the recommended practices for spark and throttle controls, clutch and brake pedals and gearshifts, which were formulated as military standards. All of these recommendations were accepted.

#### Truck Standards

A proposed standard emergency rim clamp so designed that a truck equipped with 36 x 6-in. wheels in front and 40 x 8-in. wheels in the rear can carry a 38 x 7-in. rim as spare with a 40 x 8-in. tire (the latter being a standard oversize for 38 x 7-in.) and thus make it unnecessary to carry two sizes of spare tires was submitted, but was referred back to the committee because the discussion made it evident that the proposed lug had not been sufficiently well tested to make certain that it would prove satisfactory in actual service. A slight revision of the present standard rim clamp bolts was approved, as was also a set of standard dimensions for passenger car wheel spokes.

# Completion of Front Hub Standards Postponed

By J. Edward Schipper

**H**UB standardization has received a six months' setback chiefly because the report covering the proposed standard specifications was not presented in a form acceptable to the S. A. E. Standards Committee. While members of the committee were almost unanimous in their approval of the spirit of the report, it was felt that the printed report brought before the standards meeting did not satisfactorily present the work of the committee and that it would consequently be advisable to refer the matter back. Action to this effect was taken with the result that the report will not come up for final actions until the summer meeting of the Society is held.

The discussion of the report brought out the fact that all the manufacturers vitally concerned approve of the work. Objections were made by the Gurney Ball Bearing Co. that the report did not cover the installation of ball bearings, and in view of these objections the title of the report, when it next appears, will be Roller Bearing Front Hubs for Trucks instead of Hubs for Wood and Metal Wheels.

In discussing the objections of the ball bearing manufacturer to these recommendations, it was pointed out that 95 per cent of the installations are roller bearing, the notable exception being that in the White trucks. This company manufactures its own axle and consequently does not materially affect the situation from a standards standpoint. It was also pointed out in answer to many questions on this point that it is impracticable to have a common standard for both the ball and roller bearings because, where the same diameters can be used, the capacity rating of the ball bearings will be about 70 per cent of the roller bearing capacity.

## Campaign Begun Last June

Largely through the efforts of AUTOMOTIVE INDUSTRIES, which has frequently noted with concern the annual waste and inconvenience to the trade of unstandardized hubs, the program for motor vehicle hub standardization was inaugurated in June, 1920, by representatives of wood and metal wheel manufacturers in co-operation with manufacturers of axles, hubs, bearings, rims and tires. This program has been carried out by a committee consisting of four representatives of prominent manufacturers of axles, C. T. Myers, chairman, and the Standards Manager of the S. A. E., ex-officio, secretary.

The standardization of wheel hubs for front and rear axles for both passenger cars and motor trucks was too big a task to be undertaken at one time, hence it was agreed that consideration of rear axle hubs should be deferred and that only front axle hubs for motor trucks, which afforded better opportunity for immediate progress should be considered in the first instance. Following completion of this part of the program, work will proceed on passenger car front axle hubs and then on rear axle hubs for both types of vehicle.

It is evident that since real hub standardization depends upon bearing sizes and location, which in turn depends upon spindle design, the logical procedure was to design a series of spindles for load capacities that

would cover the range of the various motor truck models having load capacities from  $\frac{3}{4}$  to 5 tons.

In order to have a minimum number of spindles, the passenger car and motor truck requirements were studied and ratings selected that permit the use of the lighter truck axles on heavy passenger cars, or vice versa. From this followed the selection of proper bearings for these spindles and the design of wheel hubs to fit these bearings.

The proposed designs for the five sizes of spindles and hubs for motor trucks have been laid down on the basis of definite maximum load ratings in pounds on the tires at the ground, so that they can be checked up to determine whether or not any particular spindle is being overloaded, by simply running the front wheels of a motor truck onto a platform scale. These ratings were selected with reference to existing practice in motor truck construction, and to the load rating of the solid tire and wheel built around each spindle and hub.

**The spindles and hubs have no other rating, however, than that of their capacity in pounds on the tires at the ground.** No matter what the rated load capacity of the motor truck may be, the spindle and hub to be used will depend upon the weight distribution of the loaded vehicle, which determines the load the front wheels must carry. This weight need not be as of estimate only, as it can be checked by the scales measurement.

The spindles are so designed that the center of the tire where it touches the ground is vertically under the center of the inner bearing. This arrangement differs from that in many designs of truck front hubs now in use in that it brings the point of contact of the tire on the ground considerably nearer the projection of the steering pivot center on the ground and makes steering much easier. For a given tread and frame width it permits a greater angular movement of the front wheel and therefore a shorter turning radius. It also reduces to a marked extent the pressure on the steering pivot and its bushings. The location of the tire so that the load is under the inner bearing instead of between the bearings, also reduces the bending moment, which is due to the vertically applied load on the spindles. In the case of many axles now in use, this bending moment is three or four times as great as in the case of the proposed standard spindles.

## Spindle Design

The spindles have been designed with large fillets at the shoulder, an important feature that has often been slighted in the past. It strengthens the spindle at the point of maximum stress and has the effect of moving the shoulder toward the load line, thereby decreasing the moments by shortening the lever arm to the point of load application. General practice among axle makers is to use a low nickel or chrome nickel steel, such as S. A. E. No. 2340 or 3140, for spindles, but the stresses in the proposed spindles will be low enough to allow the use of S. A. E. Steel No. 1035 if it should become necessary to do so under extraordinary circumstances.

It may be questioned why smaller spindles are not proposed in order to lighten and cheapen the axles and work



the steel closer to its elastic limit. This is not done because absolutely safe practice must be observed for standard use; bearings large enough to serve in these hubs permit the use of the spindle sizes recommended; the proposed spindles actually weigh less than many spindles in present use for the same service; and in event of a shortage of alloy steel a carbon steel can be used.

The selection of the bearings was guided by a study of the types, sizes and extent of their use for this application in the trade at this time. Figures for 1919 show that about one and a quarter million bearings were used on commercial car and motor truck front axles. Taper roller bearings constituted about 90 per cent of the total, straight roller bearings constituted less than 5 per cent, and ball bearings about 5 per cent of the total. The main advantages of roller bearings over ball bearings on front axle spindles are greater durability, ability to withstand heavy end thrust loads, permissible use of smaller sizes and their lower cost.

This work was started with the intention of establishing, if possible, hub and spindle dimensions whereby ball and roller bearings would interchange, but it was found that there would be difficulty in getting recommendations from the manufacturers of ball bearings and roller bearings by which such interchangeable dimensions could be developed. After careful consideration, it was not deemed reasonable to burden the entire industry with the extra expense and weight which such a set of hubs would entail in order to afford interchangeability for a type of bearings that constitutes but one-twentieth of the production for motor truck front axle

hubs. Further, this one-twentieth part is practically accounted for by the bearings used in the motor trucks of a single large producer, which to some extent makes its own bearings. Long experience in the use of these bearings has made it evident that they are so large that they could not be worked into the proposed standardization with any reasonable expectation of adoption.

Eliminating the bearings used by the one company referred to it was found that roller bearings covered by the spindle sizes proposed have been used by practically the entire motor truck industry. To do otherwise than adopt these sizes would offer grounds for grave criticisms, and would undoubtedly open the way for rejection of the program by those most interested in it.

There are at least four manufacturers of taper and straight roller bearings which can furnish interchangeable bearings for the proposed hubs. Even had the hubs been made large enough to take the bearings recommended by the ball bearing manufacturers, they would have varied enough from the roller bearing dimensions to have necessitated complete additional tool equipment, and real interchangeability would not have been possible.

The advantages of hub standardization have been dealt with in several articles in *AUTOMOTIVE INDUSTRIES*, and there is no fear among those who have been working with this project that this minor setback will discourage the members of the committee. Such minor differences as have existed are already wiped out, or are well on the road to being eliminated. The revised report will doubtless be adopted at the summer meeting.

## The Business Session

By Herbert Chase

**P**RESIDENT VINCENT opened the business session with an address in which he reviewed the work of the past year and indicated in what direction he felt this work could profitably be extended. He stated that the Society is taking part in the work of the American Engineering Standards Committee while still reserving its right to independent action, but has declined the invitation to join the American Federation of Engineering Societies largely because it is felt that the funds the S. A. E. would be called upon to expend in this direction are considerable and can be used to better advantage in other activities. He favored continued co-operation with the American Petroleum Institute and said that he believes the standards work of the Society should have more publicity during the formative stage in order that all who have a legitimate interest will be able to follow its progress and offer constructive criticism. He stated that the Council of the Society has decided to appoint a research committee with authority to plan and promote research work, securing the necessary funds to push the work forward, but without itself conducting the actual tests involved. It is understood that the Society will co-operate with the Bureau of Standards and the American Petroleum Institute in this connection. Mr. Vincent favors a campaign of education that will instruct the automotive engineer in matters pertaining to the oil industry as well as to keep them advised concerning the latest developments in fuel research.

In concluding his remarks, President Vincent spoke of the need of fostering aircraft development not only in commercial lines but as a means of developing personnel that will prove a military asset in case of need.

Treasurer Whittelsey reported that the total assets of

the Society are in excess of \$150,000, these assets having increased by over \$30,000 during the fiscal year ending Sept. 20, 1920. Over \$22,000 was spent for standardization work last year.

Chairman Beecroft of the Meetings Committee reported that the total attendance at Society meetings last year was about 2500, and that 88 papers had been presented at the various meetings.

The Membership Committee reported an increase of 16 per cent in the membership during the last year, the membership as of Jan. 1 being 5231.

In the report of the Council it was brought out that the Society expends annually over \$58 per member, although the dues for member and associate grade are only \$15 per year.

The business session was concluded with talks by Henry M. Crane and Herbert W. Alden on the engineer's place in the industry. Mr. Crane held that it was the duty of the engineer to know not only the principles of the vehicle he designs but the principles of production of the various parts in order that these may be intelligently designed for economical output. He stated also that the engineer must be conversant with what the public wants in order that the vehicle produced will be readily salable; this, of course, involving co-operation with the sales department. Mr. Alden indorsed Mr. Crane's remarks and indicated that the value of an engineer and his standing in any organization is usually dependent upon his ability to co-operate and willingness to accept responsibility. He urged greater thoroughness in making investigations and a merging of individuality with a view to serving all departments of the business.

The tellers appointed to canvass the mail vote covering

annual election of officers reported that the ticket named by the nominating committee had been almost unanimously elected. President-elect Beecroft thereupon acknowledged his appreciation of the honor conferred upon him and pledged his best efforts in advancing the work of the Society during his administration.

David Beecroft, the new president of the Society, is Directing Editor of the Class Journal Company. The following biographical sketch is furnished by the Journal of the Society:

President Beecroft was born in 1875 at Marnock, Ont., Can. His business life started in 1893 when he taught a country school for one year previous to finishing university work at the Barrie Collegiate Institute. This was followed, beginning in the fall of 1895, with a six-year period of school teaching in St. Thomas, Ont., during most of which time he was connected with the editorial department of the St. Thomas *Daily Times*.

Leaving St. Thomas in the summer of 1901, he went with the Chicago *Daily News* as an advertising solicitor, remaining until December, 1902.

In December of 1902, on resigning from the Chicago

*Daily News*, he took the editorship of the *Automobile Review*, which was until then a monthly automobile publication printed in Chicago. It was at once changed to a weekly, and he continued there for about fifteen months, resigning on March 1, 1904, to take the position of assistant editor of *Motor Age*. He served for two years in this capacity, and when *Motor Age* was purchased by the Class Journal Co. of New York he became editor.

In July of 1911 he took, in addition to the *Motor Age* work, the position of managing editor of *The Automobile*. In November of that year he also became managing editor of *Commercial Vehicle*, and in February of 1914 he took a similar position with *Motor World*.

Since entering the automobile industry he has been particularly active in connection with automobile contests. He drafted the first stock car racing rules and pioneered the registration of stock cars. He has served on the A. A. A. Contest Board for many years.

Mr. Beecroft became a member of the Society in 1911 and has served on the Council for four years. He has been a member of the Meetings Committee for five years and its chairman for four years.

## A Brilliant Annual Dinner

By Clyde Jennings

THE chief feature of the successful annual dinner at the Hotel Astor was the introduction of C. F. Kettering as toastmaster, upsetting the long established precedent of employing a professional for that task. It is a safe probability equation that the membership will never vote to go back to the paid individual. This is said without casting any aspersions on the former toastmasters, who were very good in their way but who sometimes displayed a lack of exact understanding of the industry from an engineering point of view. With Kettering, of course, it was a case of entirely co-ordinated knowledge and jokes, with an ability to pass compliments and criticism, founded both on fact and personal friendship, backed by an ever ready wit and novelty of expression.

President Jesse G. Vincent opened the program by reviewing in few words the year just closed. He spoke especially of the fine support given to the officers of the Council and the members, and said that if the members and the Council would continue this same measure of support he knew that the new administration would prosper. He introduced Mr. Kettering.

The toastmaster had much sport with David Beecroft, the newly elected president, whom he introduced. He said that the society had run out of engineers for president, so they had done the next best thing and had followed the trend of fashion and had selected an editor.

President Beecroft in a brief speech made the points that the engineers of this country had accomplished a great task in taking the vehicle as developed in Europe and making an efficient production job of it. This was the task for American engineers because production was the great need of this country.

Now that this task had been accomplished, there remained the task of adapting the vehicle to the great uses of the world. This problem was before the engineers and the speaker thought it necessary that the engineers go to all parts of the world and study the needs of the vehicular transportation where the vehicle will be used and design accordingly. When this is accomplished, he said, the great world's markets will be open to American manufacturers, and this in turn will profitably utilize the

expanded manufacturing space that was bequeathed to the industry through the war.

Much interest was shown in the talks of the evening. R. E. M. Cowie, vice-president of the American Railway Express Co., introduced himself as the representative of the largest motor truck operator in the world. After reviewing the history of the express business, and its growth, he put before the engineers the problem of simplified construction and a smaller maintenance cost for their vehicles. He said while the internal combustion engine and its consequent vehicle might not appear complicated to the engineer, it did appear so to the user.

But it was when he touched upon aviation that the speaker most impressed his audience. He spoke of the great need for the faster transportation vehicle and said that he was one of those who believed that the Government should go to full length in developing this means of transportation. He said that the small beginning made in airmail experiments were only a taste of what should be done and that he hoped that in the near future the Government would supply for air transportation all that it was now supplying for marine transportation.

Following this talk, Toastmaster Kettering made a plea for more members for the Aero Club of America, which, he said, had been transformed into an organization of great possibilities and promise, with Myron T. Herrick of Ohio as president.

George E. Roberts, a vice-president of the National City Bank, was the last speaker. He is not one of those who promise great prosperity for the immediate future, but told how production had been thrown out of balance during the war and even to a greater stage since the armistice. The great problem now, he said, was to restore this balance. This had been the objective of the bankers in their credit adjustment beginning almost a year ago.

At present, he said, the price on farm products had been restored to a near normal point. Because of the great bulk of business depending upon the prosperity of the agricultural interests, it is necessary to adjust the manufacturing prices and industrial wages to a balance with the farm prices.



# Observations at the New York Truck Show

Few changes of a radical nature in evidence. Influence of war designs seen in fitting of bumpers and tow hooks on many models. Flexible frame a feature of Ward-LaFrance. Most heavy trucks use radius rods, but take torque on springs. Many models have improved facilities for lubrication of chassis parts. Closed cabs are fitted in many cases.

By P. M. Heldt

**A**LTHOUGH it was held in two large buildings—the Twelfth Regiment Armory and the First Field Artillery Armory—the New York motor truck show was not a national or a manufacturers' show, but rather a dealers' show, and many of the most prominent truck makers, such as Packard, Pierce, Mack, White, Autocar, etc., were not represented. However, there was a sufficient array of trucks of all capacities to make an interesting exhibit. A few truck models, mainly of the speed wagon type, were shown the first time, but on the whole novelties were not particularly plentiful.

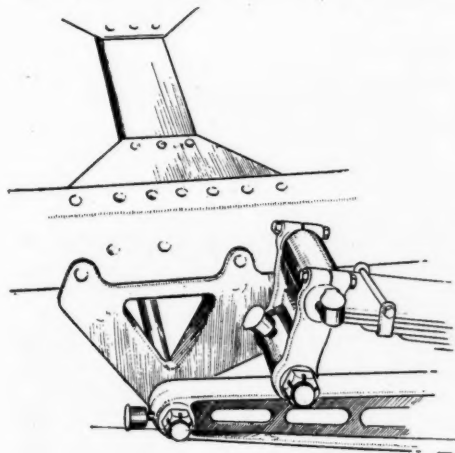
Truck design is not stationary; that it is progressing could easily be demonstrated by showing side by side a number of 1910 and 1921 trucks. However, most frequently the changes are matters of detail and can hardly be observed on the complete truck, while more important changes or complete redesigns often are separated by intervals of years.

## Frame Design

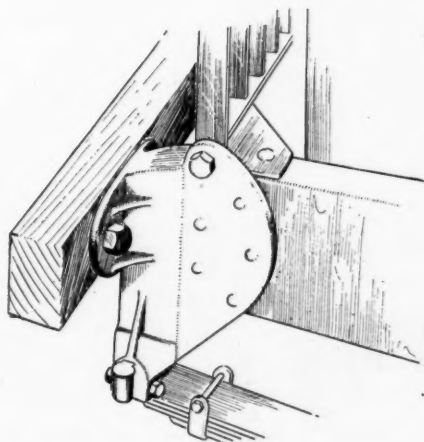
One important problem in connection with motor trucks is the design of the frame. It is fully recognized that it is impossible to make the frame rigid, as it is a flat structure and has to support heavy loads, the dead load, moreover, being augmented by road shocks. Flexibility of the frame is therefore allowed for, especially weaving of the frame, which means twisting around a longitudinal axis. In view of the absolute certainty of weaving occurring in service,

both the engine and the transmission (where the latter is mounted separately) are now always mounted with a three point support. It has been found that, owing to the continuous distortion of the frame and the shocks and jars to which the chassis is subjected, the trunnion support wears more rapidly than might be expected, and this gives rise to an unpleasant chatter. To minimize this wear these trunnion supports are now made of much larger diameter (about 3 in. on large units) than formerly. In the most careful designs provisions are even made for readily adjusting the trunnion in case of wear.

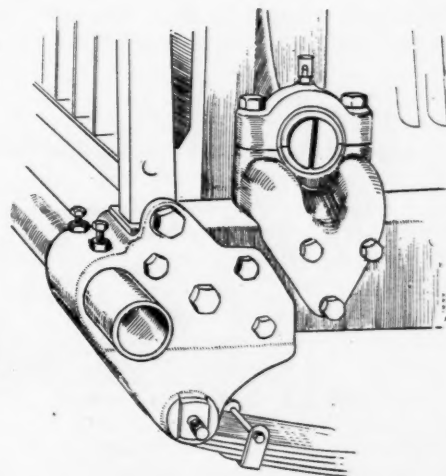
Some designers specially aim at great flexibility of the frame in a vertical direction and in the new Ward-La France truck there are no regular cross members, only tubular spacers. To secure the necessary stiffness or resistance to distortion in a horizontal plane two diagonals of strap iron are used at the middle part of the frame, the junction of these members being reinforced by a drawbar and tubular spacers. Such diagonal braces are also used on other makes of trucks, usually at the rear end. They obviate the necessity for heavy gusset plates and are probably more effective. Some truck frames were noticed in which practically no provision was made against distortion in a horizontal plane; that is, there were neither diagonals nor substantial gusset plates, and the cross members were few and light. There is no doubt that such construction is responsible for many breakages of engine arms and trouble with radiators. The necessity of making



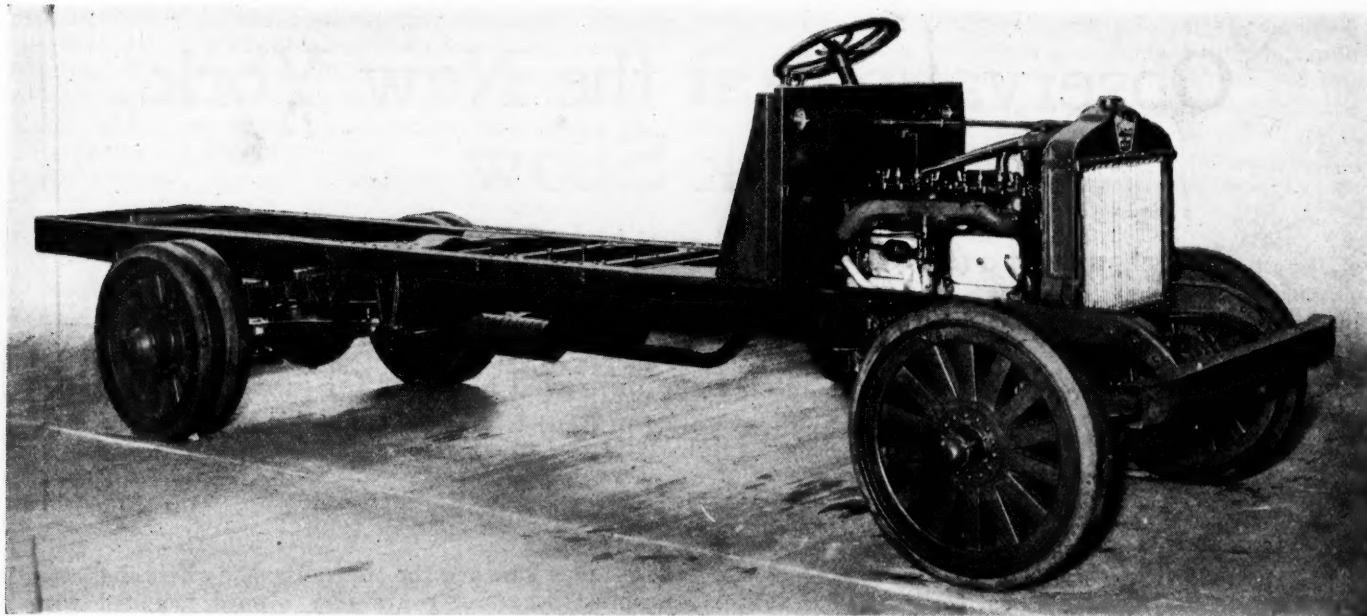
Central cross-bracing of frame on Clydesdale



Wooden bumper on Indiana truck



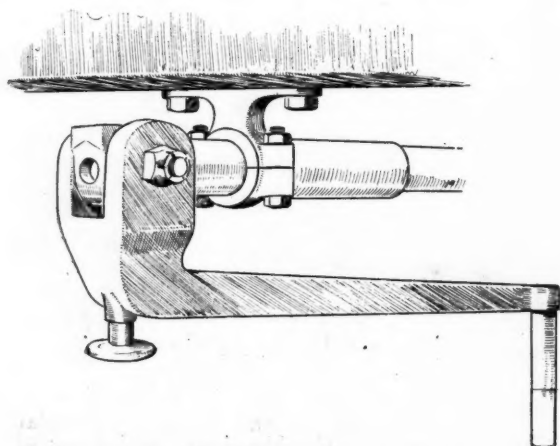
Combination spring and bumper bracket on Selden



New Rainier 3 1/2-ton truck chassis

the engine supports flexible is realized more and more. In the new Service speed truck, for instance, all the engine holding down bolts have coiled springs under their heads, so that the supporting arms can withdraw slightly when the frame distorts. Also, in the heavier trucks it has now become the practice to use four universal joints, two between the engine and gear box and the other two between the gear box and rear axle.

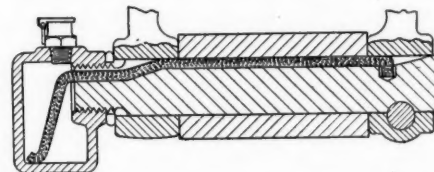
While military truck design has had some influence on commercial truck practice, it has not led to the general adoption of the Hotchkiss drive, as was predicted by some engineers. The general practice on heavy trucks appears to be to take the torque reaction on the rear springs but to provide radius rods for the driving thrust. An exception is found on the large Bridgeport truck. In this the drive is taken by the rear springs, whose forward ends are pivoted to the frame. Then there are members which look very much like radius rods, which are hinged to lugs on the forward side of the rear axle housing and to a bar which is adapted to slide forward and backward in a guide formed by a frame bracket. Radius rods generally have a universal connection with the frame at the forward end, an eye bolt parallel with the frame side rail being mounted in a frame bracket and having the forward end of the radius rod pivoted to it. This construction is evidently somewhat cheaper than a spherical joint.



Folding starting crank on Transport

Special attention was paid to the different ways of mounting the frame on the rear springs. The springs are always outside the frame, and owing to the overhang there is a considerable tendency to twist the side rail. In most cases the frame is provided with a cross member at the rear spring front brackets, which gives the necessary rigidity at this point. In the Clydesdale and one or two other makes this provision against torsional stresses on the frame side bars due to the overhang of the springs is particularly effective. The spring bracket and the bracket for the forward end of the radius rod are in one piece. The radius rod forward ends are pivoted on the ends of a round cross bar about 8 in. below the frame rail, and in addition there is a channel shaped cross member, with its open side down and with its top even with the top of the side rails. In some cases the rear ends of the rear springs are mounted on the ends of rather slender cross bars, and one could not help getting the impression that under heavy load these cross bars would "spring" considerably, which would mean rapid wear of the spring bushings. Of course, where the rear spring bracket comes close to the rear frame cross member, the latter may lend sufficient stiffness to the bracket in which the cross bar is mounted. However, a form of spring bracket which sup-

Wick-oiled spring bolt on Transport



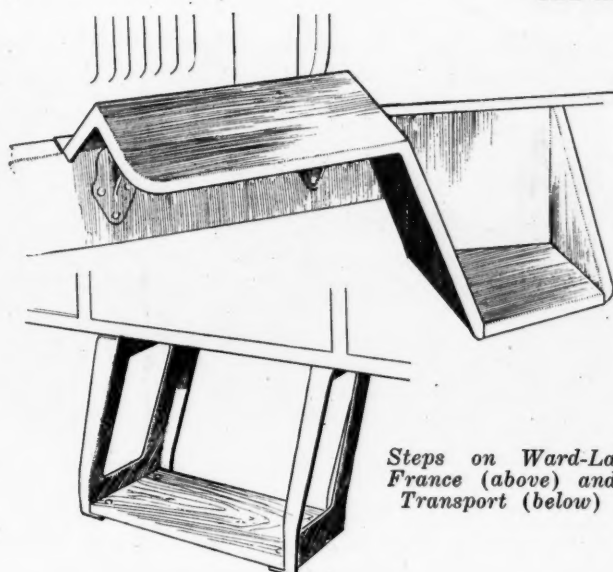
ports the spring bolt at both sides of the spring would be preferable even in that case.

#### Trussed Frames

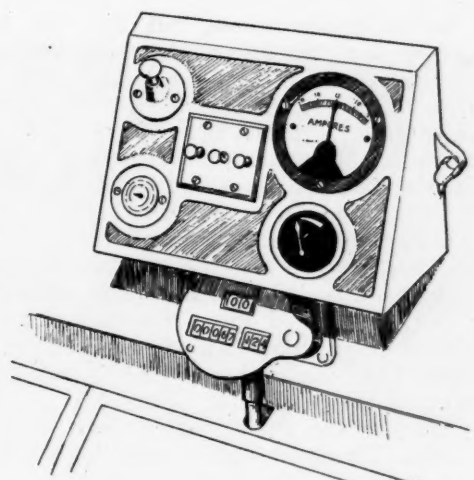
A large majority of the truck frames are now made of pressed steel, but the frame side members, as a rule, are tapered very little toward the ends, particularly the rear end. This is no doubt due to the different load distribution as compared with a passenger car. The Clydesdale was the only truck noticed in which there was considerable taper in the side members.

It is rather remarkable that not more trucks have their frames trussed, as quite a saving in weight could evi-





Steps on Ward-La France (above) and Transport (below)



Instrument panel on Clydesdale

dently be effected by the use of trusses. Frames of railway cars are always trussed, and of the German motor trucks surrendered to the American Army a large number had trussed frames, though it is possible that in the latter case the trusses were put on after the trucks were built, to take care of the additional stresses due to the use of wood and steel tires. At the show the only trucks with trussed frames noticed were Nash Quad and the Indiana.

Towing hooks are now fitted to the front ends of the frames of many of the larger trucks. These were required on all war trucks and were found a most handy fitting in an emergency. As they cost but little and as their usefulness must be apparent to every purchaser, it seems a good plan to make them a part of the regular equipment. Design of bumpers also has been influenced by war experience, and the latest Transport and Indiana models are fitted with wooden bumpers similar to that on the Class B war truck.

#### Brackets and Fittings

The brackets and fittings of truck frames are gradually getting neater, and quite a technique is developing in motor truck design. Some trucks are fitted with channel steel bumpers whose ends are curved slightly backward, and in that case the spring horns are formed with projections which accurately fit into the bumper channel. Combination brackets save on machining and are used largely for the forward ends of truck frames. An example of this is found on the new Selden model. A single casting serves as a spring bracket, bumper bracket and radiator guard bracket.

The Nash Quad, although not a new truck, arrests attention because of its many unusual features. Thus the

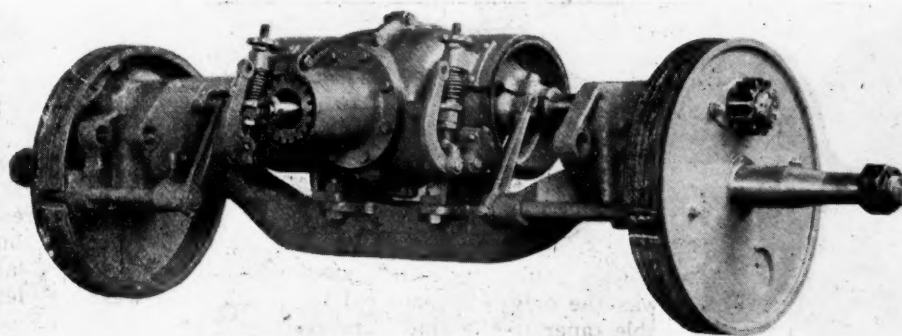
half elliptic springs are very light, giving a very flexible suspension for relatively smooth roads, but in addition to these there are volute auxiliary springs, which share the load with the half-elliptics when unusually severe bumps are sustained.

There is considerable variety in the design of steps. The most common practice is to use two pressed steel hangers, and either a wooden or embossed metal step. On the Ward-La France truck, the step is made of pressed steel and forms a part of the front fender. Some manufacturers object to making the step a part of the front fender, arguing that the continued use of the step will tend to cause the fender to get out of shape. On the Transport truck the fender consists of two cast hangers riveted to the frame and an easily renewable wooden step. Wood for the step has the advantage that it does not get slippery with wear.

#### New Type of Internal Gear Drive Axle

The Kelly-Springfield Motor Truck Co.—now a part of Hare's Motors—exhibited a new 3½-ton model with an overhead type of internal gear drive rear axle. Heretofore the chain drive has been standard on Kelly-Springfield trucks. The new axle, which is made for the Kelly-Springfield by the Clark Equipment Co., has a chrome nickel steel supporting member with a downward bend at the middle, which is forged with lugs to which the housing of the differential and bevel drive gear is bolted. From this housing extend the jackshafts which do not have the usual tubular coverings but instead carry drums for the service brakes on both sides of the housing. This model now also has a four-speed and reverse gear, while the engine remains the same. The torque reaction is taken on the springs, while the drive comes on the radius rods.

Among the models exhibited for the first time was the Moline 1½-ton truck, which has the same engine as the Moline Universal tractor. This engine has its valves in the head and the valve cover is water jacketed, which permits of arranging the water outlet centrally on top of the engine as in an L or T head engine. This is specially desirable in the present case because thermo-siphon circulation is used. Formerly the piston pins in the Moline engine had a bearing



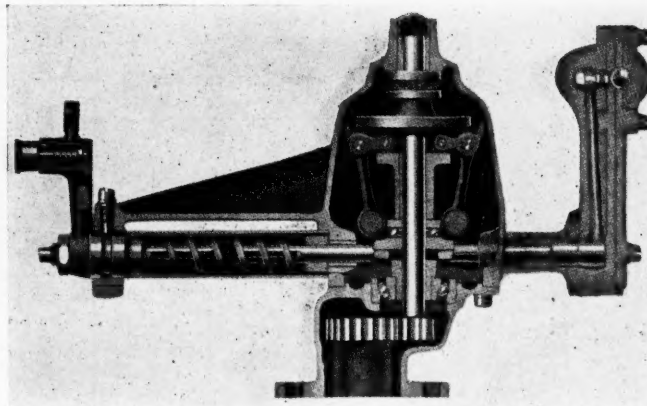
Clark overhead drive internal gear axle on Kelly-Springfield truck

directly in the piston bosses, but now the bosses are bushed. Instead of the Remy electric control system, the Pharo governor is used. Ignition is by a Splittdorf magneto. The pressure gage and the throttle control lever are mounted on a fixture on the steering post so they are in plain sight of the operator. The choker can be operated both from the dash and from in front of the truck. This is convenient in cold weather, when the driver sometimes wants to partially close the choker when the engine is still cold and therefore operates irregularly. Circulation of the cooling water is by thermo-siphon action, and the radiator fan is enclosed in a shroud. Fisk pneumatic cord tires are fitted all around. The wheelbase is 130 in. and the weight of the chassis complete is 3635 lb. The rear system is the Torbensen internal gear drive. The four cylinder Moline engine has a bore of  $3\frac{1}{2}$  and a stroke of 5 in. The crankshaft is exceedingly robust, being  $2\frac{1}{2}$  in. in diameter, and the connecting rod head is of such large size that the piston and connecting rod cannot be withdrawn from the engine through the cylinder when the cylinder head is taken off, but must be removed from below.

A new line of trucks, exhibited for the first time, was the Clinton, manufactured by the Clinton Motor Truck Corp. This line comprises four models, of 5,  $3\frac{1}{2}$ ,  $2\frac{1}{2}$  and  $1\frac{1}{2}$  tons capacity, respectively. Standard parts are used throughout, including the Continental engine, Brown-Lipe clutch and change gear, Timken axles, Parish & Bingham frame, Spicer universal joints and Ross steering gears.

On one model of the Clydesdale was shown a pair of electric headlights of rather unique design. These were pyramidal in form, with an octagonal front, and bolted to the sides of the radiator. On this same model there was a neat instrument panel secured to the dashboard (see sketch). The instrument panel was slanted so as to give the driver a good vision of the instruments, and contained the ammeter, oil gage, magneto lock switch, lighting switches and choker.

On some makes of motor truck the starting crank is supported by a bracket bolted to the forward end of the engine crankcase and is then sufficiently far back so it will not be injured when the truck runs into an obstruction. On other trucks, however, the starting crank is carried by brackets under the front cross member of the frame, and in this case the starting crank, when in its operating position, is the most forward portion of the truck, hence, is easily injured. In that case it is necessary to give the crank a folding or swiveling form, and fold it out of the way when not in use. On the Indiana truck, for instance,



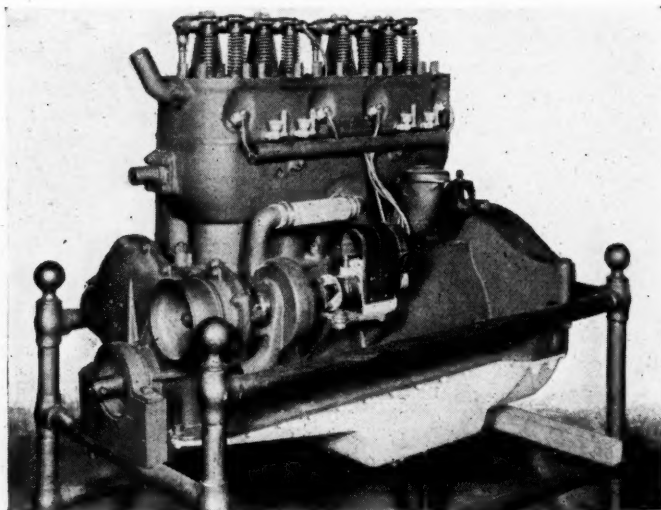
Section of Hinkley governor

the starting crank is carried in a swivel bracket, depending from the forward cross member of the frame, and when not in use, the crank is swung around and its arm is held by a clasp in such a position that the whole crank lies horizontally. On the Transport truck (see sketch) the crank can be swung around through an angle of 90 deg. and locked in both the working position and the position of rest, by means of a spring latch.

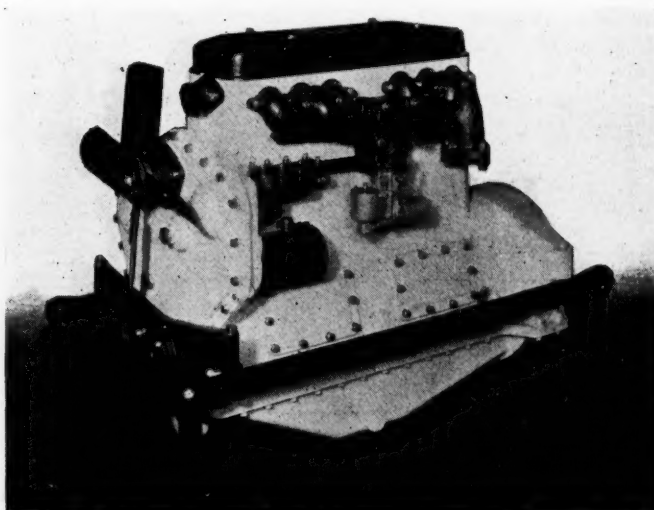
#### Improved Chassis Lubrication

Much attention has been given in recent years to the subject of chassis lubrication, and many trucks exhibited at the show were provided with either the Alemite system of grease lubrication, or with a wick oiling system. On the Transport truck, for instance, the spring bolts are provided with an oil chamber at the outer end, into which extends a wick which passes through a slot in the bolt, extending practically the entire length of same. On the  $3\frac{1}{2}$ -ton Transport model, these wick oilers on the spring bolts are intended not only to lubricate the spring bolts themselves, but also the spring leaves.

The Hinkley Motor Corp. exhibited for the first time the model HA-1600 truck and tractor engine, which is of the overhead valve type. This has a bore of  $4\frac{1}{2}$  in. and a stroke of  $5\frac{1}{2}$  in., giving a displacement of 352 cu. in., and weighs approximately 900 lb. The oil pan is of aluminum and has an oil capacity of 8 qt. A chrome nickel steel crankshaft is used. Provision is made for both magneto and battery ignition, and also for an electric starter and generator. The engine is provided with an SAE No. 2 bell housing. Three point support is used, there being a large trunnion



Hinkley overhead valve engine



Van Blerck truck engine



bearing at the front end. Lubrication is by the force feed method, a gear pump being mounted in the oil pan below the oil level. Any standard make of carbureter can be fitted, in conjunction with a hot spot manifold.

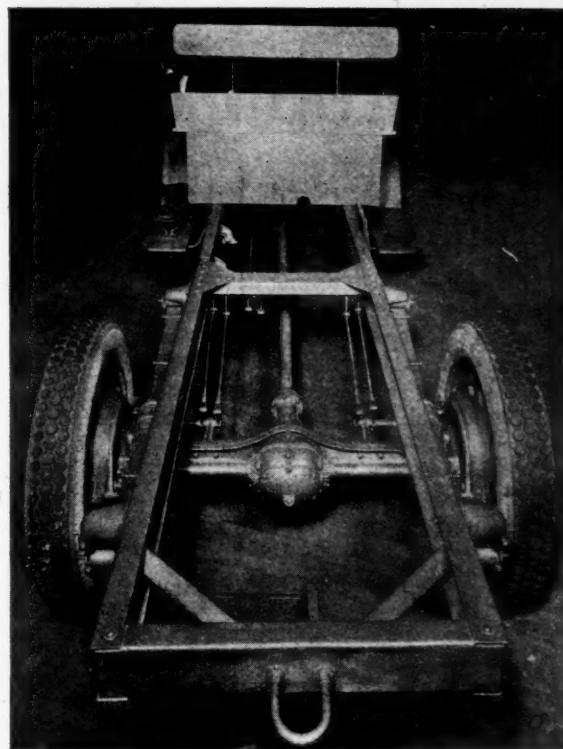
#### Hinkley Governor

The feature of the new engine is the governor, which is original with Mr. Hinkley. It is of the flyball type, and is mounted at the rear end of the engine, being geared up from the camshaft. The governor has four flyballs, which revolve on a vertical axis. The centrifugal force on the flyballs is counteracted by a coiled torsion spring, acting through a lever on the sliding collar of the governor. The outer end of the torsion spring is secured to the hub of an adjusting lever, which is adapted to move over a sector with a number of adjustment holes in it. Thus the governor can be readily set to hold the engine down to any maximum speed within wide limits. The governor is very sensitive, and when set in any definite position, controls the speed of the engine within narrow limits between no load and full load.

An exhibit was also made of the Van Blerck engine, which was described in these columns last winter, at the time of the Kansas City tractor show. This is an engine designed for use as a tractor, marine or truck engine, certain features being made differently for the different applications.

The Parish Mfg. Co., manufacturers of pressed steel frames, showed a complete truck frame of alloy steel. This company is now prepared to furnish frames of molybdenum steel, which when properly heat treated is said to have an elastic limit of 150,000 lb. per sq. in.

A large proportion of the heavy trucks exhibited were shown with closed cabs, and there is little doubt that these cabs will become a standard feature of truck construction in the future. These cabs are fitted with windows all around, so as to allow the driver free vision in all directions, and they enable him to operate his truck in comfort in all kinds of weather. Provision is made to open practically all of these windows in mild weather, and the driver therefore need never be without fresh air. It is now customary to mount the headlights inside the



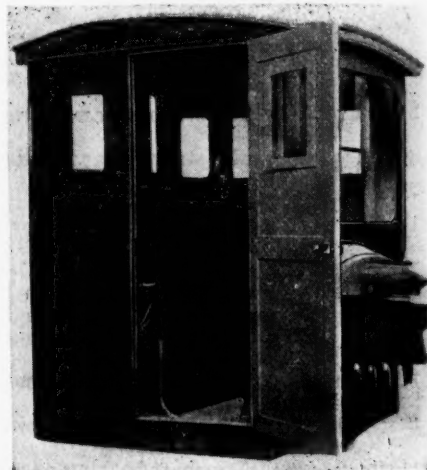
Rear view of Moline speed truck chassis

cab, against the rear side of the dash. This has the advantage that the lamps throw some light through a side lense on the dash, making it easier for the operator to read his instruments in the dark, and in the case of kerosene lamps, which are most generally used, there is no danger of the lamps blowing out in stormy weather.

In addition to complete trucks and chassis, there were shown a number of trailers and truck bodies, as well as several exhibits of truck parts and accessories. Prominent among the latter were traction devices and chassis lubricating means.

## A Winter Truck Cab

WITH the increase in long distance hauling and trucking, and realization of the need of weatherproof cabs in winter time, these units are rapidly being developed. The Acme Motor Truck Co. has just brought out a standard winter cab which can be furnished on all of its models. It is so designed as to preserve the lines of the



Winter top for  
Acme trucks

vehicle and it is recommended for use with the Acme truck because of its better fit and blending of lines with body.

This new cab is constructed of oak and built around the regular seat box. It is completely ironed at points of stress and designed to stand up under rough service. The side sections are constructed of waterproof veneer panels, curving toward the rear with a sheet metal corner construction running full height. An opening 5¾ by 11¼ in. is provided in each corner. This is fitted with Pyralin so the driver has a clear view of traffic approaching from either side. The back of the cab is fitted with sliding windows which can be opened or closed for ventilating purposes. Each of the side panels has a 6 by 11 in. Pyralin light. The doors run full height of the cab and have a 9 by 11 in. Pyralin light which can be increased to approximately 10 by 15 in. The doors swing toward the front and are provided with anti-rattle locks. The top of the cab is built of ribs and slats covered with a heavy grade of oil duck.

The general dimensions of the cab are as follows: Width, 48 in.; height from top of frame, 61 in.; depth from front to rear, same as on standard models; height from top of cushion to inside of roof, 40 in.; length of ventilating windshield, 41¼ in.; height, 23½ in. The list price of this winter cab is \$125.





# Accurate Methods in Keeping Stock Records

A stock keeping system proves itself good or bad when called upon to meet a real test. The system described in this article was able to tell within three days every article that a large fire had consumed. Accurate stock records are especially necessary in these times of business economy.

By Fred J. Huntley\*

ON Christmas Day building No. 11 at the main plant of the Cadillac Motor Car Company in Detroit was destroyed by fire, and with it went great quantities of supplies and tools. On Monday following, just three days later, A. M. Elmer, superintendent of general stores, was able to report the exact value of all property lost.

This may seem at first thought almost like a bit of fiction, but it is true. And, furthermore, if fire again should visit the plant, an equally prompt report would be forthcoming. The records were so complete and so satisfactory that the company had no difficulty in settling this particular loss.

But this is not all there was to that Cadillac fire. Certain of the equipment in this building was covered by separate records kept by an old pen-and-ink method. When the adjusters reached these there was a different story and considerable delay resulted before everything was straightened out. The Cadillac Motor Car Company is not the only concern that has had experience with stock records when fire has stepped in. Many have experienced days and even weeks of delay with the inevitable accompanying loss, simply because their records were inadequate.

To give a clear picture of the way posting is handled and what constitutes the posting media in keeping Cadillac stock records, it will be best to trace a requisition and purchase order through the various steps.

Posting to the "Incoming" or debit side of an account is made from "T-requisitions" on the Purchasing Department and also invoices. The posting media for outgoing material include inter-plant transfers, requisitions, inter-department transfers and sales orders. Since requisitions make up the bulk of posting, it will be well to tell first how they are handled. To begin with, they are made in quadruplicate and then sent to an "Approval Clerk," whose duty it is to look up the stock sheet for the item ordered. If it is stock, the clerk sends the triplicate to the stockroom, where it is authority for making the delivery. The second copy goes to the factory Accounting Department, and the original is used as a posting medium. This the clerk inserts next to the account affected in the ledger tray.

When a sufficient number of requisitions have thus been "stuffed" into the ledger tray it is sent to another girl who figures the value of the articles requisitioned. As the work is done on a machine, it only takes a few seconds to make the extensions. The tray then is sent to the posting clerk. Debits and credits are posted in separate runs. The requisition is posted to the credit side of the quantity record and also to the value record.

After posting debits, the clerk locates the first account with a credit to be posted, designated by the requisition

"stuffed" alongside. Thus it only takes a second or two to handle each item.

Since no posting is to be made to the "On Order" record, the sheet is turned so that the bottom half is in printing position. Date, classification, department letter and number are posted in one operation. The machine carriage then moves into position where the old balance is printed. Since there is no debit entry, the carriage is moved to the "out" position, where the withdrawal is listed and automatically subtracted. The new balance, which has been extended automatically, is printed in the "on hand" column and the carriage is shifted into the "value section." Here again the old balance is picked up; then the unit value shown on the last debit entry is listed. The credit as shown on the requisition is entered and the new balance extended. This done, the sheet is restored to the tray and the requisition turned face downward. This procedure is followed until all credits have been posted.

As the debits already have been posted, the tray is sent to a girl whose duty it is to prove the work. She does this by multiplying the quantity on hand by the unit value and if the results check with the new balance in the "value section" she knows the account has been posted correctly. She also makes sure that the entry shows the proper department and reference number. Now as to the case of a purchase or debit. When the girl, in pricing outgoing material, discovers that this issue will reduce stock beyond the minimum shown at the top, she inserts a cardboard slip with the warning, "Stock below minimum."

After a tray has been posted a girl looks it through for these "low water marks" and writes a "notice to investigate stock." The warning then is turned upside down where the printed line "Notice Written" is shown. The notice finally goes to an investigator, who ascertains the probable demand for this item and the length of time required to replenish the stock, also the approximate cost. If the facts warrant, he directs on his report that a new minimum be set or that the quantity ordered be changed.

When this report is received a "T-requisition" is written and, if approved, the "T-requisition" is posted. The posting in this case is to the "On Order" section of the stock ledger. This purchase requisition is "stuffed" in the ledger and is posted as a debit. The "Notice Written" strip then is removed and the requisition is sent to the Purchasing Department. The third copy of the requisition is a "Notice to Inventory Stock" and goes to the stockroom, where a physical inventory is made of this item. This constitutes the only inventory the Cadillac Motor Car Company takes of tools and maintenance material.

When material is received it is checked by an inspector, and a copy of the purchase order is matched with the in-

\*Advertising Service Division, Burroughs Adding Machine Co.





HSE TAPER SHANK		SIZE 13/64"	
For part No. 32406		ACCT. NO. 60	
K-16		UNIT Pieces	
QUANTITY	PRICE	VALUE	TOTAL VALUE
248		4800	20000
008			
248		2700	22500
128		2700	22500
008			
248			

QUANTITY	PRICE	VALUE	TOTAL VALUE
248	48.00	4800	20000
128	36.00	1200	36000
008	24.00	1200	36000
008	12.00	1200	36000
128	19.00	2700	21647
008	25.00	1300	26000
128	13.00	1300	13000
008	25.00	1300	13000
128	13.00	2700	22222
008	40.00	2000	20000
038	20.00	1300	13000
038	65.2		6578

NOTICE TO INVENTORY STOCK  
STOCKROOM REPORT

DATE 4-6-20

S.R. 13 &amp; 10

INVENTORY AND INVENTORY  
CHECKING SLIP

DATE 4-6-20

DATE 4-6-20

DATE 4-6-20

ORDERED ON T40301

RECEIPT OF MATERIAL 2 Days

C.M.C. CO. NO.

RIAL

sd DRILLS, # 1 Morse Taper

is .0001" plus .0003" per  
.0015" plus .000".

SHIP VIA Express

J. W. Davidson

J. W. Davidson

The price clerks, posting clerks and checkers stamp these orders so that any error may be traced. Checking methods play an important part in the efficiency of the stock record. Burroughs calculators are used in figuring of extensions and proving of postings.

The "Notice to Investigate Stock" is written when the posting clerk has called attention to the fact that stock is low. The triplicate is returned after the stock clerk has made an inventory of this item, and his report is checked by perpetual inventory clerks with the ledger account

## INTER-DEPARTMENT TRANSFER No 213406

FROM DEPT. 1024 TO DEPT. T.S.R. 24 D31

## INTER-DEPARTMENT TRANSFER No 213406

FROM DEPT. 1024 TO DEPT. T.S.R. 24 D31

## INTER-DEPARTMENT TRANSFER No 213406

FROM DEPT. 1024 TO DEPT. T.S.R. 24 D31

## STOCK RECORD COPY INTER-DEPARTMENT TRANSFER (213406)

FROM DEPT. 1024 TO DEPT. T.S.R. 24 D31

DATE April 6-1920 ACCOUNT

QUANTITY 6 NAME 13" Drills. SYMBOL

REC'D BY H Carter COST EACH 2.00 AMOUNT 12.00

FILLED DATE 4-6-20 WRITER'S SIGNATURE J. W. Davidson

POSTED DATE 4-6-20

POSTED BY 3 CHECKED APR 6 ENTER ONLY ONE CLASS OF MATERIAL ON A TRANSFER

## COMMERCIAL TOOL REPLACEMENT NO. 25101

FROM DEPT. D 24 TO DEPT. D31 T.S.R. NO. 24 PLANT NO. 1

DATE 4-6-20 LOCATION 11 ON K-16

QUANTITY 6 DESCRIPTION OF ARTICLE

## COMMERCIAL TOOL REPLACEMENT NO. (25101)

FROM DEPT. D 24 TO DEPT. D31 T.S.R. NO. 24 PLANT NO. 1

DATE 4-6-20 UNIT VALUE 2.00 TOTAL \$12.00

QUANTITY 6 DESCRIPTION OF ARTICLE

13/64" High Speed DRILLS.

# 1 Morse Taper Shank.

2 POSTED APR 6 WRITER'S SIGNATURE C. G. Beattie

5 POSTED APR 6 STOCK RECORD COPY 3424

3 CHECKED APR 6

APPROVALS CLERK

ENTER ONLY ONE CLASS OF MATERIAL ON A REPLACEMENT

## INTER-PLANT TRANSFER No 86782

FROM PLANT No. 1 DEPT. No. 1024 TO PLANT No. 2 DEPT. No. T.S.R. 24 D31

ACCOUNT DATE April 6-1920

NO. OF PIECES SYMBOL DESCRIPTION COST EACH AMOUNT

6 13" Taper Shank 2.00 12.00

High Speed Drills 18 PRICED APR 6

KIND OF MAT'L WEIGHT CASTING PRICE FOUNDRY ORDER NO. CASTINGS STILL DUE ON ORDERS

FILLED DATE 4-6-20 CHECKED BY Jones SHIPPED BY Carter

FILLED BY J. W. Davidson DRIVER'S SIGNATURE H. Smith VIA Pick-up

POSTED DATE RECEIVED BY C. G. Beattie

POSTED BY 4 CHECKED APR 6 WRITER'S SIGNATURE J. W. Davidson

POSTED BY 4 CHECKED APR 6 ENTER ONLY ONE CLASS OF MATERIAL ON A TRANSFER

## STOCK RECORD COPY INTER-PLANT TRANSFER No (86782)

FROM PLANT No. 1 DEPT. No. 1024 TO PLANT No. 2 DEPT. No. T.S.R. 24 D31

ACCOUNT DATE April 6-1920

NO. OF PIECES SYMBOL DESCRIPTION COST EACH AMOUNT

6 13" Taper Shank 2.00 12.00

High Speed Drills 18 PRICED APR 6

KIND OF MAT'L WEIGHT CASTING PRICE FOUNDRY ORDER NO. CASTINGS STILL DUE ON ORDERS

FILLED DATE 4-6-20 CHECKED BY Jones SHIPPED BY Carter

FILLED BY J. W. Davidson DRIVER'S SIGNATURE H. Smith VIA Pick-up

POSTED DATE RECEIVED BY C. G. Beattie

POSTED BY 4 CHECKED APR 6 WRITER'S SIGNATURE J. W. Davidson

POSTED BY 4 CHECKED APR 6 ENTER ONLY ONE CLASS OF MATERIAL ON A TRANSFER

voice and receiving slip, and goes to the invoice clerk to be "stuffed" into the ledger.

The clerk first figures the new unit value by dividing the balance on hand in money value by the new balance on hand in pieces.

The posting clerk enters receipts in all four sections of the stock account. The quantity received first is posted to the "On Order" section, and the new balance on order extended. The money value and the unit value of the items on the invoice then are posted. The sheet next is turned up and an entry made in the quantity section, the new balance being extended. Finally the value section is posted and the new balance extended. The new unit value as shown on the slip also is listed. When a tray is finished and the clerk encounters such an entry, she proves the work by multiplying balance on hand by the new unit value.

The accounts are carried on heavy loose-leaf sheets kept in steel trays. Each sheet has four divisions so as to show

a record by quantity, a record by money value, the quantity on order and the value of each invoice. There are thirty-six trays—twenty-seven for plant one, six for plant two, two for plant three and one for plant four. Various colors are used to indicate the plant or department where the stock listed on each sheet is located.

The machine repair accounts are filed numerically, a code system being employed so that the number indicates style or type and size of machine. Commercial tools and supplies are filed alphabetically. In order to standardize the description of each item, a "specification" sheet is carried with each group of accounts listing similar articles.

As soon as the work of gathering the necessary information is completed, these specification sheets will show every department and operation requiring the tool or material described. This will serve as a guide in buying, because the probable requirements may be easily ascertained from the departments listed.

## Steel Chart for Engine Manufacture

**I**N the design of gas engines it is essential that the material selected for the various parts be of a grade best suited to withstand the stresses to which that particular part is subjected. Much has been written about the advantages of the different steels, but very little about their

specific use. In the accompanying chart the grades to be used for the parts of an engine are arranged in a convenient form, together with their physical properties and proper heat treatments. The chart was compiled by E. Everett Buchanan.

Parts	Material	Physical Min. Requirements Lb. per Sq. In.	Heat Treatment Deg. Fahr.	Parts	Material	Physical Min. Requirements Lb. per Sq. In.	Heat Treatment Deg. Fahr.
Carbonizing stock Crankshaft Cam follower Thrust bearings Cold drawn tubing	Carbon, .10-.20 Manganese, .30-.60 Sulphur, .040 max. Phosphorus, .045 max.	Scleroscope, 75 For tubing— Ultimate, 55,000 Yield, 35,000 Compression test must show no cracks	Carbonize 8 hrs. at 1650-1700, cool in pots Quench 1650-1675 Quench 1450-1475 Draw 300 or more	Crankshaft Connecting rods	Carbon, .35-.45 Manganese, .60-.90 Sulphur, .040 max. Phosphorus, .040 max. Chrome, .80-1.25	Ultimate, 130,000 Yield, 110,000 Elongation, 15% Reduction area, 40% Brinell, 260-290	Heat to 1550-1575 Cool slowly Quench 1510-1540 in oil Draw 1075-1100
Sheet steel Push rods Rocker arms	Carbon, .20-.30 Manganese, .30-.40 Sulphur, .045 max. Phosphorus, .045 max.	Ultimate, 60,000 Yield, 40,000 Elongation, 1 Reduction area, 50%	Quench 1540-1660 if necessary Anneal?	Valves	Carbon, .45-.65 Manganese, .20-.30 Sulphur, .030 max. Phosphorus, .030 max. Chrome, 2.50-3.25 Tungsten, 13.00-14.00		
Water pump shaft nuts, etc.	Carbon, .30-.40 Manganese, .50-.80 Sulphur, .045 max. Phosphorus, .045 max.	Ultimate, 90,000 Yield, 60,000 Elongation, 15% Reduction area, 50%	Quench 1530-1570 Draw 950-975	Valve springs	Carbon, .40-.50 Manganese, .60-.90 Sulphur, .040 max. Phosphorus, .040 max. Chrome, .90-1.20 Vanadium, .15	Ultimate, 170,000 Yield, 160,000 Elongation, 16% Reduction area, 55%	Quench 1670-1700 in oil Quench 1570-1600 in oil Draw 980-1000
Cylinder studs Main bearing studs Engine bed bolts Connecting rod bolts All other bolts Gears	Carbon, .25-.35 Manganese, .50-.80 Sulphur, .045 max. Phosphorus, .045 max. Chrome, .40-.70 Nickel, 1.00-1.50	Ultimate, 150,000 Yield, 130,000 Elongation, 14% Reduction area, 40% Gears Brinell, 325-365	Quench 1540-1560 in oil Draw 890-910 Draw gears 8000	Annular bearings	Carbon, .85-1.20 Manganese, .20-.35 Sulphur, .020 max. Phosphorus, .020 max. Silicon, .18-.24 Chrome, 1.30-1.60	File hard Test for brittleness	Heat in salt bath to 1500-1525 Quench in oil Draw at 575 in oil
Piston pins Rocker arm pins, etc.	Carbon, .30-.40 Manganese, .30-.60 Sulphur, .040 max. Phosphorus, .040 max. Chrome, 1.00-1.50 Nickel, 3.00-3.50	Ultimate, 175,000 Yield, 140,000 Elongation, 12% Reduction area, 40%	Quench 1520-1540 in oil Quench 1450-1470 in oil Draw 800-820	Balls	Carbon, .90-1.05 Manganese, .30-.45 Sulphur, .025 max. Phosphorus, .025 max. Silicon, .20 max. Chrome, 1.10-1.30	Crushing strength 3 ball method 1 in., 67,000 ¾ in., 45,000 ½ in., 23,000 ⅜ in., 12,000	Quench 1450-1500 Draw 500

## Gasoline Vehicles for Explosives Transport

**F**OR some years before the war British Inspectors of Explosives had been pressed to obtain approval of the conveyance of explosives in gasoline motor vehicles, but in view of the number of fires occurring in connection with such vehicles they considered they would not be justified in accepting the risk involved. From the very outbreak of war, however, the employment of gasoline motor trucks became a matter of necessity, and it was therefore deemed desirable to legalize the position by obtaining the approval of the Secretary of State to the temporary use of these

vehicles under certain specified conditions for the carriage of explosives during the war only. As a result, however, of the vast experience gained during the four years of war, the authorities recommended that this approval should be made permanent, subject to certain conditions. In October last these facilities were further extended by the approval of the conveyance in any mechanically driven vehicle of modern design of small-arm nitro-compound in quantities not exceeding 500 lb., provided all reasonable precautions are taken to prevent accident.



# Trends Shown by Statistics of New York Show

These trends are, frankly, not representative of the industry. They are comparisons of the cars exhibited in the New York show. The list of exhibitors and the number of cars shown by each should be kept in mind. Perhaps the most interesting feature is the trend in number of cylinders.

**D**ESPITE various differences in engineering and merchandising features, the outstanding statistical fact of the 1921 New York Show was its similarity to the 1920 exhibit.

Exactly the same number of exhibitors were represented, although the ratio between accessories and car exhibitors changed slightly. Of the 307 exhibitors in 1920, only 81 presented cars, while this year there were 86 different car exhibitors. Seven more cars were shown than last year.

Three electric cars were represented by seven models, while one steam car was shown. One of the electric cars exhibited a stripped chassis.

The sharpest change in statistics is noted in the relative number of four-cylinder and six-cylinder models shown. In the four-cylinder models there was an increase of 15 over last year, while a decrease of 10 in the number of six-cylinder models appears.

These statistics are especially interesting, since an analysis of the figures for past years shows an almost continuous increase in the proportion of six-cylinder

models shown each year since 1914 and an almost proportionate decrease in the four-cylinder type. The six-cylinder type comprises about 62 per cent of the total, however, and so must still be considered as the dominating model.

There were 31 eight-cylinder cars shown as against 29 last year, the change being so slight as to indicate merely that this type is holding its own. There were but three twelve-cylinder cars shown this year, all by the same exhibitor.

Only two exhibitors showed air-cooled cars, the total cars of this type being seven. There were 12 sleeve-valve motors, the other 321 being tappet valve types.

The L-head type of valve placement was numerically the largest with 180, being followed rather closely by the valve-in-head type with 119.

The four and five-passenger touring car was the most popular of the open models, while the increasing popularity of the sedan is indicated by the fact that 80 models of this kind were shown. Thus two-thirds of the closed models exhibited were of the sedan type.

Despite a goodly number of disk and wire wheels, artillery wheels, usually of wood, were used on 63 per cent of the cars exhibited.

Several features which appeared in past years were no longer found even in small numbers at this year's show. The two-cylinder car, which appeared for a brief space in 1914, was missing, while the last motorcycle exhibit has apparently disappeared from the automobile show. In 1920 one motorcycle was shown, but this year no exhibit of this kind was to be found.

## NEW YORK SHOW STATISTICS

General Statistics	1913	1914	1915	1916	1917	1918	1919	1920	1921
Total Exhibitors.....	424	340	317	319	323	331	198	307	307
Car Exhibitors.....	89	78	80	84	95	79	56	81	86
Gasoline.....	..	..	..	..	..	..	..	..	83
Electric.....	..	..	..	..	..	..	..	..	3
Accessory Exhibitors.....	320	259	223	306	227	252	141	225	221
Cars Exhibited.....	276	269	228	264	282	263	225	334	341
Gasoline.....	226	265	221	251	272	252	223	324	334
Electric.....	10	4	7	13	10	11	2	8	7
Steam.....	..	..	..	..	..	..	0	2	1
Chassis Exhibited.....	49	37	51	56	54	34	..	..	38
Four-wheel Brake.....	..	..	..	..	..	..	..	..	1
Engine Characteristics—									
Gasoline Cars.....									
Two-cylinder.....	..	2	..	..	..	..	..	..	..
Four-cylinder.....	229	183	146	158	146	94	40	65	80
Six-cylinder.....	133	131	160	154	161	171	141	223	213
Eight-cylinder.....	..	..	8	50	55	40	34	29	31
Twelve-cylinder.....	..	..	..	17	16	9	8	7	3
Air-cooled.....	5	6	3	3	..	..	..	..	7
Water-cooled.....	261	258	218	248	..	..	..	..	325
Tappet valve.....	215	254	213	247	270	252	..	..	321
Sleeve valve.....	10	10	6	15	2	..	..	..	12
Revolving disk valve.....	..	..	..	..	..	..	..	..	1
Valve-in-head.....	..	..	..	..	..	..	..	..	119
L-head.....	..	..	..	..	..	..	..	..	180
T-head.....	..	..	..	..	..	..	..	..	29
Body Styles—Gasoline Cars									
Open cars.....	213	195	175	194	195	175	127	176	163
Roadsters 2-3 pass.....	52	51	51	76	68	40	..	..	40
Touring cars 4-5 pass.....	164	145	129	125	140	143	..	..	91
Touring cars 6-7 pass.....	..	..	..	..	..	..	..	..	32
Enclosed cars.....	53	43	36	28	37	77	79	119	120
Coupees 2-3 pass.....	19	17	7	6	6	13	..	..	23
Sedans 4-5 pass.....	2	2	3	2	..	43	..	..	80
Other closed 6-7 pass.....	23	16	19	14	19	8	..	..	27
Wheel Styles—Gasoline and Electric Cars									
Wire wheels.....	..	..	..	..	..	..	..	..	70
Disk wheels.....	..	..	..	..	..	..	..	..	56
Artillery wheels.....	..	..	..	..	..	..	..	..	215

## HOTEL EXHIBITORS 1921

Total exhibitors.....	13	2-3 passenger roadsters.....	3
Cars exhibited (all gasoline).....	19	4-5 passenger touring cars.....	2
Stripped chassis exhibited.....	2	6-7 passenger touring cars.....	4
Four-cylinder.....	12	2-3 passenger coupes.....	2
Six-cylinder.....	4	4-5 passenger sedans.....	5
Eight-cylinder.....	3	6-7 passenger (other closed cars).....	1
Air-cooled.....	1	Wire wheels.....	4
Water-cooled.....	18	Disk wheels.....	4
Tappet valve.....	18	Wooden wheels.....	11
Sleeve valve.....	1		

As usual a number of exhibits were shown in the hotels, but the statistics concerning these cars follow out very closely the general trends indicated by the figures on the show itself. There were 19 cars in the outside exhibits, 12 of which were four-cylinder jobs, 4 were six-cylinder, and 3 were eight-cylinder. The sedan dominated in the closed-body field of this group as well.

**T**HE Index to Vol. XLIII of AUTOMOTIVE INDUSTRIES, covering the last half of 1920, is just off the press and will be forwarded without charge to subscribers who send their name and address with request for a copy. The index is mailed only to those who request a copy. Now is the time to ask for one if you wish it.

# If You Are Planning to Sell Trucks to Corn Belt Farmers

Here, condensed for quick reading, is the experience of 831 farmer-truck owners in Mississippi Valley states. Their opinion of the trucks they now use should be well worth while to the sales manager who is planning a campaign for farm sales. Roads, after all, is the big question.

**S**UMMARIZING the experience of 831 corn-belt farmers who own motor trucks, the United States Department of Agriculture found that in the opinion of nine-tenths of these men, the greatest advantage in owning a motor truck is "Saving Time"; in the opinions of three-fourths of them the greatest disadvantage is "Poor Roads," and 91 per cent believe that their trucks will turn out to be a profitable investment.

The reports, however, indicate that on most of these farms the truck has not reduced expense to any great extent, and that it supplements rather than replaces work-stock and other equipment.

On the average these trucks travel 2777 miles per year and the cost of operation is between 16½ cents and 17 cents per mile, making the total annual cost from \$460 to \$470. Each truck displaces an average of 1.2 head of work-stock. With the cost of keeping a horse a year in the corn belt around \$200, the reduction in expense for this item is in the neighborhood of \$240 per farm. For all farms the average amount of hired help saved by the trucks is \$163. On most farms these are the only two items of direct reduction in expense which can be credited to the truck, and on the average they amount to \$60 or \$70 less than the total cost of operating it.

To offset this added cost, custom hauling done with the trucks amounts to about \$50 per year for all farms, leaving only something like \$10 or \$20 annual net expense, which must be more than balanced by the saving of time of the owner and members of the family, the ability to get crops and livestock to market in better condition or at better time, and other benefits which are not directly measurable in dollars and cents, if the average truck is to be a profitable investment.

It must be remembered that most of these farms where trucks are owned are larger than the average, and are located at a considerable distance from market.

The investigation was made during the past winter and spring. Farmer-truck owners in Indiana, Illinois, Missouri, Iowa, southern Wisconsin, southern Minnesota, southeastern South Dakota, eastern Nebraska, and eastern Kansas, who raise corn as one of their principal crops, and who practice the general grain and live-stock farming characteristic of the corn belt, reported to the department the use they make of their trucks, the cost of operating them, the advantages and disadvantages of trucks for farm use, and other related information.

A study of the reports of 831 of these farmers has just been completed by the Division of Rural Engineering of the Bureau of Public Roads and the Office of Farm Management and Farm Economics.

Some of the important facts revealed by the investigation are:

The average size of the farms is 346 acres and their

average distance from market is eight miles.

Only 14 per cent of them are less than five miles from market, and 20 per cent are 15 miles or more from market.

A little over one-fourth of these men have changed their markets, for at least a part of their produce, since purchasing trucks. For those who have changed market, the average distance to the old market was seven miles, and to the new market is eighteen miles.

The rated capacity of these trucks varies from one-half to two tons. Seventy per cent of them are rated at one ton, and only 9 per cent of them at less than one ton.

Experience with trucks has caused 57 per cent of these men to decide that the 1-ton size is best for their conditions, 25 per cent that the 1½-ton size is best, and 12 per cent that the 2-ton size is best. Practically one man in four has decided that a truck larger than the one he now owns would be better suited to his conditions.

Ninety-one per cent believe that their trucks will prove to be a profitable investment.

As compared with horses and wagons the trucks save about two-thirds of the time required for hauling to and from these farms.

On the average there are over eight weeks during the year when the roads are in such condition on account of mud, snow, etc., that these trucks cannot be used. The roads on which nearly 95 per cent of them usually travel are all or part dirt.

The condition of the roads prevented the use of the trucks with pneumatic tires a little less than seven weeks during the year covered by the reports, and of those with solid tires a little over nine weeks.

Twenty-four per cent of the trucks are equipped with pneumatic tires, 27 per cent with solid tires, and 49 per cent with pneumatics in front and solids in rear. However, experience has convinced 58 per cent that pneumatics are best for their conditions, 35 per cent that solids are best, and 7 per cent that pneumatics in front and solids in rear are best.

These men have return loads for their trucks about one-third of the time.

A majority of these men still use their horses for some hauling on the road.

On more than half of the farms all the hauling in the fields and around the buildings is still done with horses and wagons.

About 40 per cent of these men did some custom hauling with their trucks during the year covered by the reports. The average amount received by those who did such work was \$132.



Their owners estimate that on the average these trucks travel 2777 miles and are used on 112 days per year.

The average estimated life of these trucks is six and one-half years, and on this basis depreciation is usually the largest single item of expense in connection with their operation.

The average cost of operation, including depreciation, interest on investment, repairs, registration and license fees, fuel, oil, and tires, is 15.2 cents per mile for the  $\frac{1}{2}$  and  $\frac{3}{4}$ -ton trucks, 15.2 for the 1-ton, 21.3 cents for the  $1\frac{1}{4}$  and  $1\frac{1}{2}$ -ton, and 25.8 cents for the 2-ton.

The average cost of hauling crops, including the value of the driver's time, is 50 cents per hour, is 24 cents per ton mile with the  $\frac{1}{2}$  and  $\frac{3}{4}$ -ton trucks, 24.1 cents with the 1-ton, 23.3 cents with the  $1\frac{1}{4}$  and  $1\frac{1}{2}$ -ton, and 21.5 cents with the 2-ton trucks.

Nearly 85 per cent of these trucks had not been out of commission when needed for a single day during the year covered by the reports, and 80 per cent of the owners stated that they had not lost any appreciable time on account of motor and tire trouble, breakage, etc., when

using their trucks. About one truck in 15 was out of commission more than 5 days, however, and one owner in 40 reported a loss of more than 5 per cent of the time when using his truck.

Fifty-six per cent of these men have not reduced the number of their work-stock since purchasing trucks. Twenty-four per cent have disposed of one or two head, and 20 per cent of more than two head. The average reduction for all farms is 1.2 head.

Half of these men own tractors as well as motor trucks. Most of the tractors are owned on the larger farms, however. Only 33 per cent of the men whose farms contain 160 crop acres or less own tractors, while 65 per cent of those with over 320 crop acres own them. The number of work stock kept on the farms where both trucks and tractors are owned is only slightly less than the number kept on the farms of corresponding size where only trucks are owned.

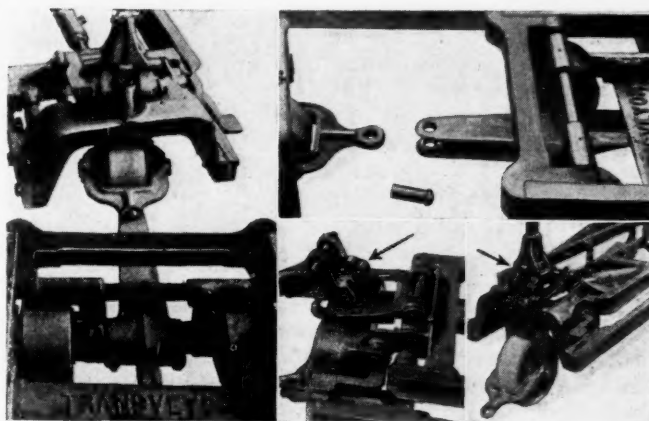
Seventy-eight per cent of these farmers state that their trucks reduce the expense for hired help. On those farms where there is a reduction, the operators estimate that it amounts to \$209 per year on the average.

## Transveyor Trailer Attachment and Safety Handle Latch

**A**N attachment recently developed for the Cowan Type G Transveyor enables the latter to be used as a trailer behind industrial trucks, either singly or as a train. The attachment fits on to the front wheel fork and hitches to the draw bar on the rear axle of the Transveyor ahead of it, or the draw bar of the electric truck. We are informed that with this attachment the trucks track quite closely and the turning radius is such that a train of ten can be turned in a 20-foot roadway. Plenty of up and down play is allowed, so that there will be no binding as the machines go over door sills or the top of steep inclines.

The safety handle latch, also illustrated, is the result of calls from safety engineers for a handle that will not fall down under any circumstances. The latch is made of tempered spring steel attached to the top of the king pin of the front wheel fork. It has two leaves.

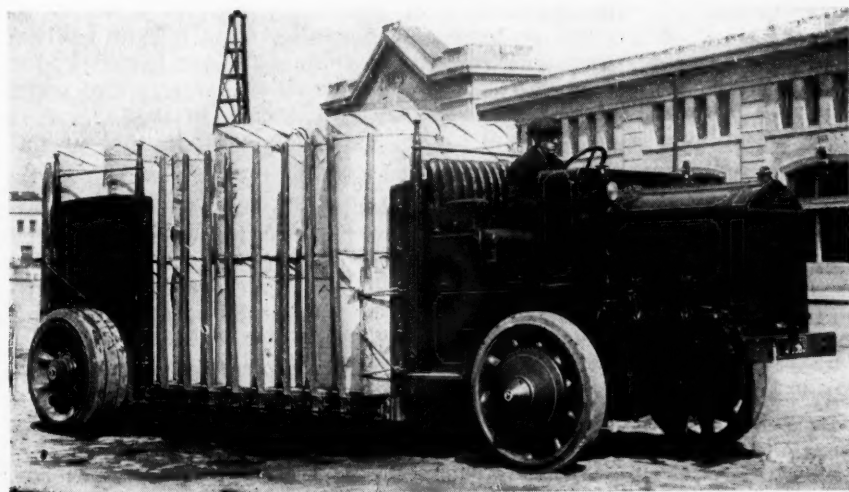
As the handle is thrown back into a vertical position, it slips over the spring, and jarring will not cause the handle to fall forward. The latch, however, does not interfere with the free movement of the handle, when it



Transveyor trailer attachment and safety handle latch

is necessary to bring it down to manipulate the Transveyor.

## McDonald Front Drive Truck



**A** SPECIAL design of truck chassis, particularly adapted to low bed construction, has been developed by the McDonald Truck & Tractor Co. The drive is to the front wheels, through a chain and an internal gear. The main load frame is carried on three-point suspension, while the powerplant rests on a separate frame and spring. Steering is accomplished by the McDonald hydraulic steering gear, and the brakes are also hydraulically operated. All of the mechanical parts are located at the front end, which is referred to as the chassis, exclusive of the rear wheels, tires and bodies.

There is considerable latitude in the type of body which may be fitted to this truck chassis, but so far the company has been specializing on low bed trucks.

# Protective Machinery in Danger of Becoming Cumbersome

As protective organizations are multiplied, or as machinery for the settlement of labor disputes is erected, the efficiency of our productive system decreases. In both business and political affairs, the smallest amount of system which will insure order is the most efficient.

By Harry Tipper

ONE of the things which we are apt to forget in the consideration of modern and social industrial affairs is the extension of the machinery for organization protection and legislation in all kinds of occupations and in all kinds of industrial groups.

Where such organizations perform a real service in increasing the understanding, improving the knowledge or otherwise developing the efficiency of the individual or concerns who are members, they are a part of the productive development of industry and can be accepted as valuable in the progress of the industrial world. Where, however, their primary purpose is to protect the members from outside aggression, from legislative difficulty or to protect their privileges, such organization adds nothing to the total productive capacity of the individual members and is concerned either with the retention of their profits, with the extension of their privileges or the maintenance of their position against other groups.

This, of course, includes to a very large extent the work of the operating parts of government. For while it is true that all these protective organizations, including the government bodies, are concerned with the improvement of knowledge in some of their endeavors, they are more largely concerned with protecting the social body at large or the industrial group from the aggressors who would destroy its peace and order.

Most of the members of these organizations have no concern either immediate or remote with the increase in the country's productivity, or the efficiency of the social organization. They do not add anything to the wealth, but instead reduce the wealth by the amount required to maintain them and to continue their operations. This does not mean that they are unnecessary. It simply means that they cannot be viewed as an advantage to the social or industrial organization, except as the organization requires protection against itself in its inability to co-operate peacefully and fairly in the work of improvement.

It means also that extensions of such organizations and particularly extension of government operations should be weighed very carefully as the continual development of the government expense is a continual additional drain upon the industrial capital, from which no corresponding return is received.

We are already burdened with a multiplicity of laws and with a wealth of technical detail in law which requires an enormous amount of information and still greater amount of advice and consideration in regard to its proper interpretation.

If the departments of government are multiplied and additional machinery provided with the idea of curing every economic ill from the labor trouble to the cost of raw product, new restrictions will be required and new departments for the enforcement and interpretation of those restrictions must be developed. This is just as true of the machinery of organization for the settlement of the labor problem.

Suggestions are made on all sides looking to the erection of national and State machinery for this purpose and the development of new tribunals before whom adjustments may be made. It is possible to carry this organization to such a degree that it becomes burdensome in the extreme without developing any hopeful basis for the solution of the problem.

Reference is frequently made to the machinery for the adjustment of labor problems in Great Britain, but this machinery has not lessened the demands or ended the warfare in industry in that country. On the contrary it has made the local settlement of a problem much more difficult; so that the ponderous machinery of the whole labor organization may be put to work all over the country for the settlement of a matter which was originally confined to a question of personal privilege in a single shop. It is not so long ago that the discharge of an employee on one of the railroads brought the country within a day of a complete railroad strike.

Unless this machinery of organization makes for enlightenment, for a better understanding between the individuals in each case, and for a better co-operation between the small groups, it is an addition to the governmental machinery which is not productive, which does not increase the wealth and which on the other hand withdraws some of the labor from productivity for the maintenance of its own organization.

Carlyle once called attention to the ability of the Anglo-Saxon to get along with a small amount of government as one of the strong features of the racial development. At all times the minimum amount of government required to maintain order is the maximum amount of efficient government.

The tendency to centralize organization authority both in political and industrial matters enlarges the governmental operation in both cases without materially enlarging the usefulness and efficiency of the result.

It is still true that if you have co-operation and order in each community in a state, it will not be difficult to



secure order throughout the state. It is still true that if there is co-operation and decent measure of justice between each employer and his employees there would be no general problem of industrial unrest.

Government is necessary so that chaos may be avoided and the industrial and social organizations continue to function, but there is a tendency to burden the government of the country and the state on political matters, the group governments of industry on industrial matters, with innumerable operating questions and innumerable precedents, traditions and restrictions. These are supposed to take the place of the co-operation between the individuals in the small group, the industrial or social unit and force improvement from the general to the individual. All this machinery is very expensive and it will not do the work which it is supposed to do, because the improvement grows from the individual to the small group and from the small group to the larger group.

This type of organization is expensive because it removes from productive work the man power which is required to maintain it and the capital which is required to pay for that man power.

In one of the articles a week or so ago, we stated that system was of no value unless the spirit of improvement and adjustment were there, and the spirit of improvement begins with the individual, with the understanding between individuals and adjustment of their relations by virtue of their understanding.

Whether in business or in political affairs, the smallest amount of government system which will insure order is the most efficient amount because it removes from the production of necessary commodities only those men who are absolutely essential for the maintenance of the order and the establishment of improvement in the spread of knowledge, the spread of understanding and the development of justice.

There is a tendency for all organizations of this type, whether they are concerned with politics or industry, to enlarge their own operations, to feed upon themselves, and this tendency is sharply indicated by the developments which have taken place in the last year and the developments which are foreshadowed in recent demands for future organization in politics and business.

If half the money were spent upon the education of the young citizens which is spent on the extension of re-

strictions for the adult, the necessity for those restrictions would be materially lessened and the money which had been expended would have been productive of a better type of citizenship and a more efficient organization. If half the money spent by industrial organizations, whether labor, professional or capital, were expended upon providing a better basis of understanding, a better common ground of knowledge and a visible area of fair play, the necessity for such protective work would be materially decreased and the efficiency of the industrial machine notably strengthened.

At this time when there are so many patent medicine venders, each with a system of restriction which is calculated to organize the nation into the millennium both industrially and politically, it is well to scrutinize with very great care every proposed extension of organization activity and see whether it is founded upon the positive platform of education, improvement and understanding in the development of justice, or whether it is formed on the negative platform of protection of privilege and rights, maintenance against aggression, and so forth.

Furthermore, all these proposed extensions of present systems or developments of new systems should be subjected to the acid test—how they will affect John Smith who is working for you and your managers, or how they will affect your neighbors and the other citizens of your community.

Unless they are inclined to bring a better element of understanding into your organization between the management and the men and between the owners and the management, they are of little use industrially and will simply add a burden to that which we already carry. Unless they are inclined to increase the understanding between the members of your community and to develop order in that community, they are of little use politically and will simply add a new burden for which industry must pay.

This does not mean that either the private citizen or the industrial owner should be allowed to retain his privileges if they are not consistent with the general good, but it does mean that a lot of the systems suggested and the additional operations talked about are suggested and talked about in the hope that they will take the place of better education and better understanding—in the hope that they will cure our troubles without labor and without thought, by some magic in the systems themselves.

## Placing Responsibility in Kansas

ONE point in a recent decision of the Kansas Court of Industrial Relations is of particular interest from the employers' point of view. The law under which the court operates, it will be recalled, provides not only that strikes may not occur in certain basic industries, but that manufacturers may not arbitrarily cease operations at their own discretion. Recently a complaint was brought by employees against the Topeka Flour Mills, which not long ago closed down to about half of its capacity. A part of the Court's decision was as follows:

"The people of Kansas have solemnly declared by legislative act that workers engaged in this industry shall at all times receive a fair wage and have healthful and moral surroundings. In the reduction of hours of operation, therefore, the millers should be very careful and solicitous concerning the matter of labor.

"Skilled and faithful employees should be given such treatment as will enable them during the period of lim-

ited production to support themselves and their families."

Such a statement would seem to imply that with industry organized on a capitalistic basis, the responsibility of providing at all times an opportunity to gain a fair living wage to those who are willing to work rests upon the employer. A discussion of this decision is expected to develop some interesting opinions and information.

DURING the year 1919 there were in Great Britain 747 trade disputes resulting either in a strike or a lock-out. During the first six months of 1920 there were 1,004 such disputes, or 34 per cent more for six months than in the whole preceding year.

The number of persons involved in the 1919 disputes, however, was 1,434,000 as against only 592,000 in the first half of 1920. This would indicate that although the 1920 troubles were more numerous, their importance was less in the average case.



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## The S. A. E. Meeting

THE plan of holding simultaneous sessions on diversified subjects at the annual S. A. E. meeting proved highly successful and will no doubt be followed at future meetings of the Society. The only reason for not following this practice heretofore has been the belief that the attendance at one or more of the sessions held at the same time would be too small to make the practice worth while. Quite the contrary has turned out to be the case. All the sessions were well attended and at all of them the attendance was larger than was that at some of the sessions of the annual meeting of the American Society of Mechanical Engineers, a much older organization with about double the membership of the S. A. E.

There is still much room for improvement in the actual presentation of the papers, particularly those which are in type at the time of the meeting. Announcements of the meeting stated that authors would give short, crisp digests of their papers without boring the audience with details contained in the printed manuscript which all can read at leisure. This was

done in some few cases, but in others quite the reverse was true. Another mistake, which should be avoided in future, is that of having several papers presented without pause for discussion and then allowing all the discussion to come at the end. By so doing many important points which should be brought out in the discussion are lost and the author's summary in reply is frequently not given at all.

The life of a meeting is usually in the discussion, providing the chairman is, as he invariably should be, familiar with the subject. The chairman should be selected well in advance of the meeting, should be furnished with copies of all papers to be read at his session, and should have before him a list of men specially qualified to discuss the subjects in hand. These men should all receive copies of the manuscripts in advance so that their discussion will be well thought out and to the point. Whenever possible all members should receive preprints of papers with request that they forward written discussion if they cannot be present at the meeting.

When simultaneous sessions are held there should be ample time for discussion, and the chairman who knows and performs his job will see that this discussion is brought out even at the expense of missing some of the papers scheduled. It is, of course, unfortunate to disappoint an author who has spent much time in preparing a paper, but it is worse to throttle discussion which is pertinent and timely, even though this may cause criticism on the part of the author whose paper is not read. Reading a paper before an organization of such standing as the S. A. E. should be regarded as a privilege; that is the Society does the author an honor by asking him to speak on a subject—the author does not confer a favor by consenting to speak. Consequently if a given subject excites unusual interest the chairman must think of the greatest good to the greatest number and perhaps forego the reading of one paper in order that another which seems to attract much interest may be fully discussed.

## Correct Registration Figures

THE registration of motor cars and trucks in the United States for the year ending Dec. 31, 1920, was announced in these columns last week as 8,873,572. This figure was a surprise to even the most optimistic. We believe that it is as accurate as was possible under the circumstances, meaning the haste in which the figures were gathered.

The difficulties of gathering registration statistics are not generally understood and frequently some one undertakes this task without a full knowledge of it. State governmental departments are often cumbersome. There is a fixed way of doing things and these methods are not responsive to an effort to gather figures promptly. Then, too, each state has peculiarities of registration. It is a considerable task to learn in just what states the total figure given out includes re-registrations, trailers and the tractors used for industrial purposes, etc. In some cases dealer licenses are subtracted from the total. Other states do not follow this practice.



The figures we published represent an intelligent handling of the figures supplied by the State officials. In some cases these officials have asked the privilege of revision. The revised figures will be printed in the Statistical Number of AUTOMOTIVE INDUSTRIES on Feb. 17. Several of these revisions have been received since the publication of the table in our issue of Jan. 13. So far the revisions have not changed the State totals to any material extent.

While on this topic it should be said that if the registration figures are to be made of the greatest benefit to the industry, many State laws must be revised. This is merely another argument in favor of adopting the proposed Uniform Vehicle Law.

## Effect of Weight on Fuel Consumption

THE subject of fuel economy is attracting so much attention to-day that makers of parts and fittings for automobiles generally are considering to what extent their products contribute to this factor. In this connection the question has come up as to how the weight of an automobile and its fuel consumption are related, and some experimental results have been quoted to us which make it appear that the consumption decreases, not in proportion to weight reduction, but much more rapidly. For example, a reduction in weight of 10 per cent is said to have resulted in a reduction in fuel consumption of over 20 per cent. This, however, is absolutely contrary to all previous experience. The resistance to the motion of an automobile on level road is made up of two factors, namely, road resistance and air resistance. The first is generally taken as directly proportional to weight being moved, and this assumption is in accordance with all physical laws and also with observations in tests. According to this law it requires at low speed exactly twice the force to move a loaded truck weighing six tons, as to move the empty truck weighing three tons.

At higher speeds account must be taken of the air resistance, and at 25 m.p.h., which is perhaps a good average driving speed, this resistance becomes an important item. The air resistance is entirely independent of the weight to be moved and varies only with the projected area and the form of the body and other exposed parts. It will readily be realized that even at a fixed speed the relation between the power necessary to overcome road resistance and that required to overcome air resistance varies widely, because of the different shapes which can be given the vehicle body. A car with a large windshield perpendicular to the axis of a car would evidently encounter much more resistance than one without windshield and modeled in true streamline form. For a touring car of average weight and dimensions the air resistance at 25 m.p.h. is about one-half the road resistance. The air resistance, of course, remains constant for a car of given dimensions even though, through the use of higher grade material, etc., the weight of the car be reduced. For instance, if the weight is reduced, say 10 per cent, the road resistance will be reduced

in the same proportion, and the combined air and road resistance at a speed of about 25 m.p.h. would be reduced from 150 per cent to 140 per cent of the original road resistance. In other words, a 10 per cent reduction in weight at the speed mentioned should result in a fuel saving of  $6\frac{2}{3}$  per cent. The saving would approach 10 per cent at very low speed and would practically vanish at very high speed.

The lighter the car the less fuel will be required for acceleration and for hill climbing, but here again the gain is substantially in proportion to the difference in weight, so long as the engine remains the same size.

The above is not intended to discourage designers who are striving to cut down the weight of their cars. Reduction of weight does result in economy, especially at low speeds at which the reduction in fuel consumption is substantially in proportion to the saving in weight. The chief reason why the light car consumes less fuel than the heavy car is due to the fact that a smaller engine can be used.

## Just Taxation

THE question of federal taxation was one of the most discussed topics during the gathering of the motor vehicle manufacturers last week and the general attitude of the manufacturers was one that cannot but meet with the approval of all fair-minded people. The manufacturers frankly believe that if the recommendations in the annual report of Secretary of the Treasury Houston are made effective, their industry will be discriminated against. They believe that an industry which produces anything so thoroughly a utility as the motor vehicle should not pay a heavy burden of taxes. Indeed, a suggestion made early in the week that the automotive industry offer to pay taxes comparable with those imposed upon railroad locomotives and equipment was often quoted.

There is no spirit of evasion of a just share of taxes. The automotive manufacturers realize that this country is heavily in debt and that this debt must be paid. They are just as patriotic to-day as they were during the war. It is the apparent disposition in some quarters to class their products as non-essential that annoys them more than the amount of money involved. Then, too, the manufacturers believe that just as they are striving to reduce the fixed charges in their business, so the government should make every effort to reduce its fixed expenses and put into effect the most modern business methods for the saving of money compatible with efficiency.

The Tax Committee of the National Automobile Chamber of Commerce is considering the problems before it. Circumstances make this one of the most important committees of the national body. From all appearances this committee is setting out to do a constructive work. When its representatives appear before the Congressional Committee they will have something to say besides entering a protest against taxes, as recommended, and will endeavor to assist the representatives of the government in reaching a just solution of the problems.

# Durant Picks Flint for New Plant

## First Unit Slated for Old Home Town

### Hohensee and Sturt, Chevrolet Officials, Join Former Chief— Organization in Process

NEW YORK, Jan. 18—The first unit of Durant Motors, Inc., incorporated at Albany late last week by William C. Durant, former president of the General Motors Corp., will be located in Flint, Mich. This decision was communicated to-day to the Flint Chamber of Commerce and was in compliance with earnest appeals to Durant to return to the city where he gained his first fame and which he is credited with having "put on the map."

News that Durant was going back into the automobile manufacturing field with a car of his own has created intense interest throughout the industry, but it caused a sensation in Flint, and ever since it was made his temporary offices in the Goodrich Rubber Co. building have been deluged with telegrams of congratulation and best wishes. They also have brought more substantial wishes, including an offer of a free site of 40 acres of land for a plant.

Durant has not told his plans in detail and probably won't for a month yet, but he already is rounding up an organization. The first man to join him was F. W. Hohensee, who resigned as a vice-president, director and member of the finance committee of General Motors the same day last week that Durant retired as a member of the finance committee and chairman of the executive committee. Hohensee has been known as one of the most capable men in General Motors, where he has been general manager of production for the Chevrolet company.

### Durant to Design New Car

The second man to go with Durant was A. T. Sturt, chief engineer of the Chevrolet company. He has had much to do with the development of that car. The fact that these two Chevrolet executives have joined Durant adds significance to his announcement that Durant Motors would produce a 4-cylinder car which would sell for less than \$1,000. It is understood, however, that the new car will include several features Durant has had in the back of his head.

It is probable it will be in a little higher price class than the Chevrolet, but will lend itself to quantity production. When it will be placed on the market has not been determined, but it is expected the company will be in operation by Aug. 1. In addition to the Flint plant

another factory will be located in the East, and it is possible the company will have a separate unit for the manufacture of engines and other parts.

The authorized stock of the company will be \$5,000,000, consisting of 1,000,000 shares of no par value. All the stock will be taken by Durant and close personal friends. It is significant that the day after the incorporation papers were filed there was active trading in the stock on the curb market on a "when issued" basis. It was the understanding that the stock was offered for subscription at \$10 a share, but most of the trading was at between \$13 and \$14, and the turn-over approximated 3000 shares.

Durant made the following statement:

### Friends and Self to Control

"While I am not ready at this time to make an announcement, it will probably not surprise you to know that I am still an interested and firm believer in the motor industry, and that I am organizing a company controlled by myself and several of my good friends, which will be in active operation Aug. 1. I cannot go into details regarding the corporation at this time other than to say it will bear the name of the Durant Motors, Inc., with one kind of stock, with no commissions, bonuses or reservations to myself or associates issued for experience, ability or performance. The Durant Motors, Inc., will be incorporated under the laws of the State of New York with authorized capital of 1,000,000 shares of no par value, 500,000 shares constituting the initial offering."

No further statement has been made as to the financing details or the names of Durant's associates. The three incorporators, besides himself, were office employees. When the company is finally organized the names of three or four men of country-wide reputation will appear on the directorate.

Decision to locate the first plant of the company in Flint was due partly to sentiment. Durant won his first success in that city and it always has been loyal to him. Immediately after he was forced out of General Motors the directors of the Flint Chamber of Commerce adopted resolutions which expressed "in behalf of the citizens of Flint the deep appreciation of his services to this community," and voiced "the hope that when his responsibilities permit he again will take up his residence here among the friends who love and respect him."

Replying, Durant said:

"You may say to the good people of the best little city in this country that one of the plants of Durant Motors will be located in Flint and say to those who so thoughtfully remembered me that I am most appreciative of and quite overcome by their kind messages of friendship, confidence and affection."

## Show Sales Rate Up With Normal Years

### Executives Regard New York Results as Auspicious—Credit Conditions Harmful

NEW YORK, Jan. 17—A final canvass of the New York show reveals these facts: Attendance compared favorably with last year and was generally accepted as better in "quality," a conclusion supported by the reports of exhibitors that "live" prospect lists obtained are far larger than those of 1920; retail sales on the floor aggregated between 50 and 75 per cent of the record of last year and were fairly well up to results of previous New York shows, except that of 1919 conducted by the metropolitan dealers and making the first public showing of automobiles after the armistice.

Show sales of cars in the class above \$3,000 ran about 50 per cent of last year's, in the \$1,500 to \$3,000 class about 75 per cent and in the class below \$1,500 a little less than 75 per cent. Some exhibitors made no sales, others did only 5 to 10 per cent of last year's business and four or five sold more cars than they did in 1920, but the average held pretty well between 50 and 75 per cent.

Wholesale business continued right up to the end of the show and was such as to give factory executives encouragement to prepare for a fair and steadily growing volume of late winter and early spring business. Dealers reported very little improvement in the stringent situation as regards financing of time sales and said bankers had not shown much inclination yet to extend additional credit for financing wholesale purchases. For this reason dealers in a good many cases placed orders for cars in small lots but expected to make almost immediate sales to finance further orders.

New York and suburban dealers expect to keep up a growing volume of sales as a result of the fine prospect lists obtained and factory executives are counting on similar aftermaths of succeeding shows to improve the situation throughout the country.

### Attendance Within 10 Per Cent

Final attendance figures showed the crowds within 10 per cent of last year's except on the opening Saturday and Friday, when the attendance was poor. Friday there was rain, at times approaching the intensity of a cloudburst, practically all day. On Thursday the attendance was within 500 of the record of the New York shows. The aggregate attendance was well up toward the average of all previous years except the one held in 1920.



# Many Companies Seek New Finances

## Banks Aid Industry in Arranging Loans

### Co-operative Spirit Helpful in Meeting New Money Strain— Credits Extended

NEW YORK, Jan. 17—Notwithstanding the easing of credit and the improvement in the general situation, the next few weeks are likely to prove the most critical encountered by manufacturers in the automotive industry since the post-war readjustment began. This is due to the fact that nearly all companies have had coming due since the first of the year large bank loans and bills to merchandise creditors.

Most companies are short of cash and as a consequence more than one large corporation has found it necessary to ask its creditors for an extension of time. This condition is almost universal and is not by any means confined to the automotive industry. As a matter of fact some other lines are in much worse plight.

Banks generally have assumed a constructive attitude and are willing to do anything within reason to keep the companies to which they have made loans moving along as going concerns rather than take action which might precipitate receiverships with a consequent shrinkage in assets. It is realized that few companies are in a position to pay all their obligations at this time.

A similar stand is taken in most cases by large merchandise creditors. They feel that if receiverships and involuntary bankruptcy petitions are avoided, they will be infinitely better off than they would be if the affairs of their creditors were placed under the direction of the courts. This means that appeals for extension of time on loans and bills are being received with sympathetic interest. In almost every case where it can be shown that the companies would be solvent under normal conditions—and there are innumerable cases of this kind—the accommodation asked is being granted.

### No Stigma to Cash Shortage

Manufacturers and banks are a unit in feeling that no stigma attaches at this time to requests for extension of time. Almost everyone is in the same boat. For that reason, less significance than usual should be attached to meetings of creditors. In most cases they are being called by the companies themselves for the protection of creditors and in the hope that some amicable plan can be agreed upon to carry them through the crisis.

A great deal of refinancing is being engineered at this time although the negotiations have been completed in only

a few cases. This applies to some of the largest companies in the industry. Important announcements along this line may be expected in the near future.

Banks have become more deeply interested in the automotive industry than they ever were before and they are convinced that its future is thoroughly sound. That is one of the reasons why they are perfectly willing to finance any sound company to which they already have made loans. They believe that by extending further help at this time, they can avert impairment of their investments.

If the next few weeks can be weathered safely, there is no need to fear serious casualties in the industry. Present conditions, however, make it even more dangerous than usual to rock the boat and invest with unusually sinister possibilities the circulation of reports that this or that company is in a bad way financially.

## Implement Association Urges Standardization

ST. LOUIS, Jan. 15—More than 450 members of the Mississippi Valley Implement Dealers Association attended the fourteenth annual convention of the organization at the Planters Hotel in St. Louis, Jan. 11, 12 and 13. The annual election of officers resulted in the naming of Frederick P. Watson of Mt. Vernon, Ill., as president for the 1921 term. The name of the organization was changed to that of the Mississippi Valley Implement Vehicle and Hardware Association and the constitution and by-laws were amended so as to permit the inclusion in membership of dealers who retailed one or more of the lines.

According to the retiring presiding officer, Henry F. Woerther of Baldwin, Mo., the most important problems of the past year which promise to affect matters of the immediate future are power farming, elimination of deposits on tractor contracts, standardization of many vital spare parts common to similar implements and vehicles of various manufacture, one line contracts of motor and other vehicles, increased freight rates, C. O. D. shipments of repairs, well defined and exclusive territories and closer mutual understanding with heads of various farm bureaus.

### COMET RESUMES PRODUCTION

DECATUR, ILL., Jan. 17—The Comet Automobile Co. re-opened this week with a small force of men. George W. Jagers, president, who has returned from a tour of leading Middle West dealers, said big distributors seemed more pessimistic over the future than the smaller ones, but general conditions warranted beginning of operations.

## Treasury Revises Excise Tax Clauses

### Top and Body Rebuilders Defined Manufacturers—New Adjustments Now Permitted

WASHINGTON, Jan. 17—Revision of tax regulations as announced here to-day by the Treasury Department imposes excise taxes on garagemen and others engaged in extensive repairs to automobile tops or bodies. The ruling places "a person, partnership or corporation engaged in business of building over automobile tops or bodies for installation on new or old chassis as manufacturers of automobile parts or accessories and subject to such a tax."

Furthermore, the Treasury has revised Regulations 47 relating to excise tax on sales by manufacturers which affect the industry. As to the basis of tax, there has been a simplification in accordance with rulings in force. Certain examples have been added outlining the method to be pursued by a manufacturer in quoting and billing the tax in order to arrive at a basis of tax and to reimburse himself for the tax which he pays.

The theory is that if a manufacturer quotes the selling price of the article and the tax in separate and distinct amounts or quotes a flat price with the statement that a certain proportion of the quotation represents selling price and a certain proportion tax, the tax attaches only to that portion representing the actual selling price of the goods.

The ruling in Regulations 47 permitting an adjustment of the tax in the case of an adjustment in price on goods sold over a period of time on a quantity rebate has been extended to permit an adjustment in the tax in the case of an adjustment in price under an agreement made at the time of the sale to make such adjustment in case of a decline in the market.

### New Ruling on Manufacturer

Article seven defines a manufacturer. This article has been modified to provide that while a manufacturer is generally a person who (1) actually makes a taxable article, or (2) by changes in the form of an article produces a taxable article, or (3) by the combination of two or more articles produces a taxable article, that under certain circumstances such a person is not a manufacturer for the purpose of the tax; but that if a dealer or jobber owns a patent, trademark, formula or recipe for a taxable article and contracts with another person or firm for the manufacture thereof, the contract specifying that the article

(Continued on page 144)

## Nash Earnings Total \$7,007,471 for Year

Company with \$12,409,378 Cash  
in Unusually Strong Position  
—Sees Normal Year

NEW YORK, Jan. 17—A dividend of \$10 a share on the common stock payable Feb. 1 has been declared by the Nash Motors Co. A regular quarterly dividend of \$1.75 on the preferred also has been declared payable on the same date.

The annual report of the Nash Motors Co. for the year ending Nov. 30 shows a net income after Federal taxes of \$7,007,471 equivalent after preferred dividends to \$122.79 earned on the 54,500 shares of common stock of no par value. This compares with net income of \$5,089,035 or \$95.06 on the 50,000 shares outstanding in the preceding year. The profit and loss surplus at the end of the year was \$12,531,837, an increase of \$5,820,471 in twelve months. With \$12,409,378 in cash, the company is in a tremendously strong position. The balance sheet as of Nov. 30 shows as follows:

Assets: Real estate, plant and equipment, \$5,257,761; miscellaneous investments, \$1,453,555; Liberty Bonds, \$1,307,600; material and supplies, \$6,212,163; notes receivable, \$941,000; accounts receivable, \$1,757,783; cash \$12,409,378; prepaid expenses \$20,023; total \$29,359,263.

Liabilities: Preferred stock, \$4,500,000; common stock (54,500 shares, no par value), \$500,000; accounts payable \$1,074,230, reserve for state and federal taxes, \$7,468,858, other reserves, \$3,284,337; surplus, \$12,531,838; total \$29,359,263.

In a letter to stockholders, President C. W. Nash said that sales for the year amounted to more than \$57,000,000 or nearly \$10,000,000 more than the preceding year. The company produced 37,263 passenger cars and 3,848 trucks. Its exports, not including those to Canada and Mexico totaled 2,700 cars and trucks. In his letter Nash said:

### Milwaukee Plant Operating

"The first units of the new plant at Milwaukee are now completed and operations started. The new four-cylinder car being turned out there is meeting with a fine reception and it is expected that it will prove a great asset to the Nash motors line.

"We have put \$1,573,083 into the Milwaukee plant for land, buildings, machinery and equipment, besides \$1,280,709 for working capital. We also expended during the year \$1,051,445 in the enlargement of the Kenosha six-cylinder passenger car and truck plant. We have practically no uncompleted construction on hand at present.

"For the first nine months of the fiscal year we were unable to keep up with the demand for our car, but beginning Oct. 1 we experienced a sharp drop which caused us to shut down our plant for a

number of weeks and for the balance of the period up the present time to operate on a reduced schedule. We were expecting this reduction and when it came had on hand less than half a day's production.

"We intend to continue a conservative production policy because we regard our distributing machinery as the most vital part of our business and we also fully realize that the bankers who are co-operating with our dealers are just as much a component part of our organization as the dealers themselves.

"We are looking forward to at least a moderately successful year."

## G. M. C. Consolidations Regarded Improbable

NEW YORK, Jan. 17—The General Motors Corp. closed 1920 in a strong position with its inventories of unfinished materials substantially reduced, its finances in good condition and comparatively few unsold vehicles on hand. It can be said with authority that the corporation does not contemplate any material expansion during the coming year, notwithstanding many reports now in circulation of consolidations with other companies.

It is felt the company's factories now are adequate to meet the demand for some time to come and that nothing will be gained by taking on additional lines. Efforts will be centered upon making all the various divisions as profitable as Chevrolet, Buick and Cadillac have been. There is a possibility that the company may abandon some of its activities not related to the automotive industry. It is understood the directors are not enthusiastic about retaining the big new Durant building in Detroit and they probably would not hesitate to sell it if an opportunity offered.

## Cotta Offers Settlement at 25 Cents on Dollar

ROCKFORD, ILL., Jan. 17—Creditors of the Cotta Transmission Co., now in bankruptcy, have received a proposition from a syndicate composed of Rockford business men, to settle all claims upon the basis of 25 cents upon the dollar and the offer has been taken under advisement. The plant is also under consideration by a Chicago firm which proposes to utilize it for the manufacture of a new type of kerosene motor for tractors. If the creditors decide to accept the offer, it is likely that a deal will be arranged with the Chicago concern and the plant reopened for the manufacture of both engines and transmissions.

### ROTH DENIES EMBEZZLEMENT

SANDUSKY, OHIO, Jan. 17—C. H. Roth, former secretary of the Erie Tire & Rubber Co., indicted on charges of embezzlement, has retained attorneys and proposes to fight the case to the end. He pleaded not guilty when arraigned and is now at liberty under bonds of \$40,000. P. F. Wills, president of the company, has also been indicted.

## Bankers Take Over Control of McGraw

Losses Due to Recent Market Conditions Cause Action—Choose  
New Directors

CLEVELAND, Jan. 17—The Maynard H. Murch Co., investment bankers of this city, has taken control of the McGraw Tire & Rubber Co. to protect the holders of preferred stock of the company. This action was taken pursuant to a right reserved when the Murch company bought a \$2,500,000 preferred stock issue of the company in August, 1919.

At the offices of Mr. Murch it was stated that the rubber company suffered severe losses from two sources as follows: First, in operation through the reduction in tire prices that followed a slump in buying; second, through the shrinkage in value in the readjustment period of quantities of fabric and crude rubber, which were bought in too large quantities on a peak market. The Murch company on taking hold of the company directed that the inventory be written down to the present market prices for all assets on hand and that all losses through contracts that the rubber company had with firms throughout the country be charged off.

In making these reductions the McGraw Tire & Rubber Co. took a loss of \$2,500,000. Most of the loss came about through marking down to present prices the fabric and crude rubber that had been bought when the market was soaring. A statement prepared by accountants showed that after taking the drastic action ordered by the Murch company, the rubber corporation had \$2,800,000 of quick assets to its credit, while the debts amount to \$1,700,000. In addition there is a plant account of \$1,500,000.

### Management Unsatisfactory

The Murch company, as guarantor of the preferred stock, has not been satisfied with the management of the company for some time, and it took the action indicated in order not only to protect the preferred stockholders, but to prevent affairs getting into a worse condition. Eight of the eleven directors of the company now are men selected by the Murch company. They are Maynard H. Murch, president of the Murch company; Walter S. Quinlan, vice-president of the Murch company; George E. Randall, president of the Foote-Burt company; William H. Marlatt, Cleveland lawyer; R. V. Mitchell, of the United Securities Co., Canton; A. H. Coffin of Counselman & Co., Chicago investment bankers; M. S. Bethel, of the Murch company, and Martin Gillan of New York, who represents New York City interests.

John Morgan was elected president of the rubber company; Quinlan, vice-president; Marlatt, secretary and treasurer. The chairman of the Board of Directors will be elected within three weeks and within the next month other announcements will be made about the personnel

(Continued on page 145)



## Highest Court Holds Seizures Authorized

### Innocence of Owners Not In- volved in Volstead Violations —Can Extend Ruling

WASHINGTON, Jan. 17—Seizures of automobiles or any conveyances in which liquors are being carried contrary to law, were held authorized by the Supreme Court here to-day whether or not the owner of the conveyance has been found innocent of contravening the law.

The decision was rendered in an appeal from a Georgia court decision. An automobile loaned by J. W. Goldsmith to a friend was seized by Federal officers when found carrying intoxicants. The court held that when he entrusted his property to another he assumed the risk of loss from whatever cause it might occur.

Justice McKenna, who read the opinion of the court, went back to the Mosaic statutes for initial justification of the Government's contention, quoting from the ancient tablets that "if an ox gore a man that he die, the ox shall be stoned and his flesh not eaten."

Counsel for Goldsmith had contended that affirmation of the decision of the lower court might mean that a Pullman sleeper might be seized if a passenger carried a quart of liquor on board, or an ocean liner forfeited to the Government, if, unknown to those in charge, a case of liquor was transported in the hold.

"Whether these indicated possibilities under the law are justified, we are not called upon to consider," Justice McKenna said. "And we also reserve opinion as to whether the section can be extended to property stolen or otherwise taken from an owner without his consent."

## Excessive Insurance Hurts Foreign Trade

NEW YORK, Jan. 18—The Foreign Trade Committee of the National Automobile Chamber of Commerce, has received complaints from members that marine underwriters had increased in some cases 200 to 300 per cent rates on so-called floater policies covering shipments from factory to foreign destination. The only explanation is that losses have been incurred, pointing particularly to damage by exceptionally long exposure to the weather during the freight congestion on the railroads in the past year or two.

Manufacturers feel that this risk is quite eliminated now that normal movement of freight may be expected. It was pointed out also that the underwriters distinguish only between the type of ship and the destination in fixing their rates, giving no consideration, however, to the highly important feature of boxing. Manufacturers who have developed and use a good strong package feel that they are being penalized on this insurance

matter for damages occurring on inferior packages.

Many suggestions were made looking for relief from the increased insurance rates, among them the possibility of co-operative or mutual insurance among automobile manufacturers, whose foreign shipments of cars and trucks last year totalled \$200,000,000. It was felt that the higher rates are particularly unfortunate at this time when foreign exchange and other conditions are tending to restrict rather than assist exports.

This whole question, together with prevailing practices of booking and forwarding shipments was referred to a sub-committee for further investigation.

## Cab Company to Make New Ambassador Car

CHICAGO, Jan. 15—Passenger cars and light trucks will be manufactured in quantities immediately by the Yellow Cab Manufacturing Co. of this city, according to an announcement of the president, John Hertz. The company for several years has concentrated its efforts on turning out 2000 cabs yearly for use in taxicab service in this and other cities.

One of the passenger cars will be known as the "Ambassador" and will be built in touring, closed, sports and imperial sedan models of 2, 4 and 7-passenger sizes. Greater production, however, will be on a 4-cylinder car, of moderate price, worked out on the "Yellow Cab" chassis. This line will consist of a 4-passenger coupe, sedan, touring car and roadster.

The trucks will include a 1-ton speed wagon and a 1½ ton speed truck.

The cars will be exhibited at the Chicago automobile show for the first time. The "Ambassador" will be on display at the New Drake Hotel and at the show rooms of the distributors, Esch and Hammond, this city.

Manufacture of the cars and trucks will be made in the new factory of the company at Menard and Dickens streets and will mean an investment of several million dollars, according to Hertz.

## COST ASSOCIATION TO MEET

NEW YORK, Jan. 17—The Industrial Cost Association whose principal office is in Pittsburgh, will hold a meeting in the rooms of the American Society of Mechanical Engineers, 29 West Thirty-ninth Street at 8 P.M., Jan. 20, to organize a New York section. Several of the national officers and directors of the Association will be present to tell of this movement. Judge Gary of the U. S. Steel Corp. has been asked to speak.

## 2000 SHERIDANS ORDERED

NEW YORK, Jan. 17—D. A. Burke, president of the Sheridan Motor Car Co., a subsidiary of General Motors, announces that dealer connections have been established in the principal cities from coast to coast and that dealers already have filed orders for more than 2000 cars. The 8-cylinder job probably will get on the market this month.

## Hartford to Sue on Starter Patents

### Car Manufacturers and Starter Makers Believed Liable by Counsel—Test Suit Ready

NEW YORK, Jan. 18—The possibility of a long list of suits against manufacturers of motor vehicles equipped with self-starters, and self-starter manufacturers for infringement of patent rights, has been opened with the award of four patents for self-starting systems to E. V. Hartford, president of E. V. Hartford, Inc., manufacturer of equipment, with a plant in Jersey City. A test suit will be started this week against a manufacturer of a standard automobile by Dunn, Goodlett, Massie & Scott, counsel for the patentee. Both the name of the manufacturer and the place of suit were withheld for the time being.

In the belief of counsel, every two unit system now on the market and in use in automobiles is an infringement on the Hartford patents in some particular. Notice of the Hartford award has been mailed this week to 230 car manufacturers throughout the country, as well as to every firm making self-starting systems.

According to counsel, the four Hartford patents as granted by the United States Patent Office on Jan. 4, this year, cover sixty-seven claims. In almost every instance these are on two-unit systems, though one or two claims are on one-unit. Applications for the patents were filed by Hartford at different times between the years 1910 to 1913. Reasons for delay in granting the patents are ascribed by counsel to the constant litigation instituted by others who had worked out similar apparatus.

## Brown Motors Settlement Sought by Stockholders

MOLINE, ILL., Jan. 18—Pending the outcome of court litigation, it was voted to postpone the annual meeting of the stockholders of the Brown Motor Co. for thirty days. The litigation now before the courts involves the relationship of President Walter F. Brown to the stockholders. The postponement of the meeting was agreed to by the executive. Preliminary to the annual meeting, an effort will be made to arrange a settlement. President Brown has intimated that he would be willing to accept \$15,000 for his interests in the concern in lieu of the proposed dissolution. An informal counter offer of \$5,000 was proffered subject to the approval of the stockholders. It is possible that concessions will permit an amicable adjustment of the controversy. President Brown invented an internal combustion engine for motor vehicles and the company was organized to manufacture the invention in quantities. When the postponed meeting is called for Feb. 10, it is expected that the settlement will be reached.

## M. A. M. A. Directors Name New Officers

### E. H. Broadwell Succeeds C. E. Thompson as President—Two Changes on Board

NEW YORK, Jan. 17—Directors of the Motor and Accessory Manufacturers Association at an organization meeting following the annual session of the members elected E. H. Broadwell, vice-president of the Fisk Rubber Co., as president to succeed Charles E. Thompson, president of the Steel Products Co., who had served two terms.

Other officers elected were: First vice-president, W. O. Rutherford, vice-president of the B. F. Goodrich Co., second vice-president, A. W. Copland, president of the Detroit Gear & Machine Co., third vice-president, H. L. Horning, secretary and general manager of the Waukesha Motor Co.; treasurer, L. M. Wainwright, president of the Diamond Chain Co.; secretary and assistant treasurer, G. Brewer Griffin; general manager, M. L. Heminway.

Two new directors were elected to the board to take the places of Christian Girl and E. W. Beach. They were F. C. Glover, vice-president and general manager of the Timken Detroit Axle Co., and H. L. Horning. Other directors besides these two and the officers are: C. E. Thompson, retiring president; J. M. McComb, vice-president of the Crucible Steel Co.; G. W. Yeoman, treasurer of the Continental Motors Corp.; C. H. L. Flinterman, vice-president of the Detroit Pressed Steel Co., and E. P. Hammond, president of the Gemmer Manufacturing Co.

The annual gathering of the association this year was one of the most successful ever held and a large number of new members were elected. It has been demonstrated that the legal and credit departments are of special value to members and this work is steadily increasing in importance. The work of Sidney S. Meyers, the general counsel, has expanded to such an extent in the past few months that it has been found necessary to add materially to his staff of assistants. The efforts of the credit department are along constructive lines and every effort is being made to save companies which are solvent but hard pressed for ready cash.

The parts and accessory makers were much gratified by the results of the New York show and are as confident as the vehicle manufacturers that the tide has turned and that business will improve from now on, although the upward trend will be gradual. It is significant that the relations between car and parts manufacturers are becoming more cordial.

### OLIVER RIM OFFICERS NAMED

ATLANTA, Jan. 17—Elmer Oliver was re-elected president of the Oliver Rim Co., manufacturers of a new double jointed rim for automobiles, at the first

annual meeting of the board of directors held Jan. 11 in Atlanta. C. E. Gregory was re-elected secretary and treasurer, and G. C. Whittaker, Southern representative of the Truscon Steel Co., was elected vice-president. The number of directors was increased to eight, the new members of the board being W. R. Massengale and J. S. Hollins, both of Atlanta; H. W. Crouch, of Johnston, S. C.; P. A. Redmond, of Aragon, Ga. The directors re-elected are Joseph A. Blount, F. A. Seegar, Neal Meier, all of Atlanta, and R. J. Aycock, of Pinewood, S. C.

## Harvester Postpones Fort Wayne Plant Work

FORT WAYNE, IND., Jan. 17—All further work on the construction of the big new motor truck plant which is to be erected here by the International Harvester Co. has been suspended for two or three months according to local officials of the company. This action was taken following a visit to Fort Wayne by Cyrus W. McCormick, Jr., works manager for the concern.

Unfavorable business conditions over the country is given by Harvester company officials as the reason. However, assurance is given that just as soon as business conditions have improved the work started here will be taken up again and will be continued without further interruption. According to the officials it is not thought that it will be necessary to suspend operations for more than two or three months.

A great quantity of material for the plant is now on the grounds. A large part of the work on the belt line railroad which will connect the plant with the local railroads has been finished.

## Receiver Appointed for Superior Truck

ATLANTA, Jan. 17—An involuntary petition in bankruptcy has been declared against the Superior Motor Truck Co., manufacturers of the Superior Truck, and Federal Judge Samuel H. Sibley has named Walter P. Andrews as receiver pending the outcome of the bankruptcy proceedings. The petition followed a verdict rendered against the truck corporation in the Federal court here Jan. 12, in favor of the Beaver Mfg. Co., for \$2879. The petition was instituted by Hubbard Brothers, and the Shearer Machine Co., Atlanta, and the L. C. Case Co., Boston. The truck company is alleged to owe large sums to various creditors and to be insolvent.

### VICTOR ON 300 DAILY BASIS

SPRINGFIELD, OHIO, Jan. 17—President H. H. Durr, of the Victor Rubber Co., declared today that the plant has been placed on a schedule of 300 tires daily, that this number will be increased gradually and that 140 men are at work. "The situation is clearing," said he, "I expect rapid resumption of business." The company plans an extensive advertising campaign.

## Sales Restriction Charged to Jobbers

### Canadian Tariff Board Asked by Dealer to Dissolve Alleged Combination

OTTAWA, ONT., Jan. 15—At the tariff inquiry just held here, R. L. Phillips of Phillips & Pringle, Fredericton, N. B., charged that business in automobile accessories was being unduly restricted in Canada. He claimed that this was due to the organization of jobbers once known as the Canadian branch of the National Association of Automobile Accessory Jobbers, but now known as the Automotive Equipment Association.

He asked that consideration should be given to the question of taking action under the Criminal Code or under the Combines Act to dissolve this "trust." He requested that the products of houses manufacturing automobile accessories, and who had little or no competition in Canada, and the sale of whose goods was practically confined to members of the Automotive Equipment Association, should be placed on the free list.

He requested, further, that legislation be passed next session to provide that a judge of the Supreme Court in any province, or other suitable person, might be empowered to investigate charges that the distribution of Canadian manufactured goods was being unduly restricted.

## Vermont to Develop Airway Possibilities

MONTPELIER, VT., Jan. 15—The early establishment of landing fields in Vermont to keep pace with the progress of aerial transportation was urged as a means of developing the state's resources, in the inaugural address of Gov. James Hartness.

He pointed out that in each previous stage of transportation development, Vermont had been handicapped by its lack of navigable rivers and the ruggedness of its surface which made railroad-ing difficult and costly, but that by taking timely action the state could be on even terms with others in air transportation.

"Our cost of road construction and our ever increasing cost of maintenance will more and more force us to use the airway which is all ready for use and costs nothing for maintenance," he said. "The future growth of towns will depend in a large measure upon the alertness in making provision for safe landings for aircraft. The landing fields are practically air ports.

"By the establishment of facilities of this kind our flying service will begin without further expense. I recommend an investigation of the needs of amending present statutes or enacting new statutes for facilitating the acquisition of landing sites by towns or under proper state or town control of private initiative."



## Cincinnati Prices Firm for Present

**Lower Wage Rates Prevailing as  
Industry Resumes—Look for  
Good Business**

CINCINNATI, Jan. 17—Optimism has the right of way among the automobile and truck manufacturers around Cincinnati. Without exception they all are preparing for an increased demand. Labor trouble is believed to be a thing of the past and the men are showing a very different attitude toward their jobs than they did last year. In none of the plants has there been any general reduction of wages, but in some of them where men who were laid off during the slack times are being re-employed, they are being cut 20 to 25 per cent in wages.

M. Schacht, of the Schacht Motor Truck Co., said they are besieged by men looking for work who are willing to take the cut made, or an even greater one if necessary, to get employment. He emphatically states, however, that any reduction of wages cannot affect the price of trucks for the present, for there has been no great decline of materials.

The United States Motor Truck Co. has made no reduction in wages and contemplates making none for the present, according to General Manager F. J. Alvin. Only efficient men now are employed in that plant and men must produce if they expect to hold their jobs. Alvin does not believe there is any possibility of reducing the price on trucks for some time under present costs of material and production.

The Sayers & Scovill Co. is operating with about 85 per cent of its normal force. They have not laid off any men, but as men left they did not fill their places. They have not made any reduction in wages and are not contemplating any for the present. The plant operates on the piece-work basis.

The Armleder Truck Co. is operating all departments, but with a reduced force. No reduction in wages has been made, but just what will be done when the plant resumes full operations has not been decided upon. Manager Woodruff of the sales department said he could not see how it would be possible to make any reduction in the price of trucks for some time.

Armleder is preparing to send a man to Europe, where the prospects for a revival of export trade are said to be growing brighter. He will go to England, France, Scandinavia, Holland, and will also look into the possibilities of India. The company is planning a big campaign for business in Cuba and preparing to go after business in Mexico.

### RANGER TRACTOR ADVANCED

HOUSTON, TEXAS, Jan. 15—The selling price of the Ranger tractor-cultivator manufactured by the Southern Motor Mfg. Assn., was advanced today from \$1250 to \$1375. This price includes cultivator gangs.

## AERONAUTICS RECORD STEADY DEVELOPMENT

NEW YORK, Jan. 15—Notwithstanding many handicaps such as lack of aerial laws, landing fields and a strong government policy, there was a steady development in aeronautics in this country last year. Among the more important events were:

Flight to Nome, Alaska and return, from Mineola, a distance of 9,000 miles in 112 hrs. flying time by four Gallaudet remodeled DH.-4-B planes piloted by officers of the army air service.

The air mail operating between New York and Washington, New York, Chicago, Cleveland, Omaha, Salt Lake City and San Francisco transported approximately 100,000,000 letters at ordinary rates.

Aerial survey of the Panama Canal Zone made by the Navy.

Coast line of Haiti mapped by the Geological Society co-operating with the Marine Corps.

World's record altitude of 33,000 ft. established by Major R. W. Schroeder in an American designed and built Packard-LePere bi-plane.

Andes Mountains crossed by Donald Hudson in a Curtiss "Wasp" at an altitude of 30,000 ft. above sea level.

Flight by a Junker monoplane from Omaha, Neb., to Lancaster, Pa., without stop.

Production by the Wright Aeronautical Corp. of a cannon motor discharging 1½ lb. shells from the propeller shaft of an airplane in flight.

## Kentucky Tire Receiver Asked in Second Suit

LOUISVILLE, Jan. 17—Ink was hardly dry on an order dismissing an action for a receiver for the Kentucky Tire & Rubber Co. in the Circuit Court yesterday when another similar action was filed, and it will be necessary for the officials to make another defense.

It was alleged in the petition that the officers of the company failed to begin operation of a factory in Louisville by Jan. 1 for the manufacture of automobile tires, and that the assets of the company were being dissipated by the payment of exorbitant salaries.

In dismissing the proceeding yesterday it was stated that the officers of the company waived any claim they might have had for damages against the petitioners on account of the proceedings. Those named parties to the two suits are H. P. Dedriksen, president; W. R. White, vice president, and J. E. and O. R. Peterman and A. D. Hite.

### CAMP GRANT SCHOOL STARTS

ROCKFORD, ILL., Jan. 17—Equipped at a cost of \$2,000,000, the automotive school at Camp Grant is now in operation with an enrollment of 400 students in the eight departments, each with its own experts and equipment. Captain John C. Daly heads this army school, assisted by Lieut. Roderick A. Stamey.

## Cleveland Retains Men at Old Rates

**Reductions Made in Only Individual Instances—No Surplus of Skilled Men**

CLEVELAND, Jan. 17—Cleveland automobile manufacturers are not taking advantage of present economic conditions to arbitrarily force down wages faster than the cost of living declines. Manufacturers agree that the present is an opportune time to build up a morale in their factory organizations for the future when business regains a normal condition. They agree that the morale can be built up by not taking an unfair advantage of labor at this time.

Some factories in Cleveland have reduced wages slightly, from scales that were imposed on automobile makers by abnormal conditions. Spring prices have not been made, and at this time no one could say what would be done in this respect as a result of labor conditions. There is not a surplus of skilled automobile mechanics here, although there is a surplus of semi-skilled men.

At the White Motor Co. the number of employees for January, 1921, is 6218, while a year ago the number was 5826. On Dec. 1 the men at this plant were notified that beginning Jan. 1 they would work five days a week. They had been working 49 hours a week; under the new schedule they work 45. The night force, which had been working 50 hours a week, and paid for 75 hours, was notified that in January they would work four nights one week, five nights the next week, and that they would work 10 hours a night and be paid for 15 hours. The men were notified Jan. 1 that on Feb. 1 they would work eight hours a day for four days each week, or 32 hours a week, and this proposal, as well as the first one, was gracefully accepted by the men. There has been no reduction in wages at this plant.

The Chandler Motor Car Co. is maintaining 70 per cent of its working force five days a week. This is an increase of one-half day a week over December. There is no surplus of skilled help at this plant.

### Winton Reduces Some Wages

At the Winton plant they report there is no surplus of automobile mechanics, but that there is a great surplus of semi-skilled men. Some of the employees who have been retained at the Winton plant received reductions in wages ranging from 15 to 20 per cent.

At the Templar factory all employees have received a 20 per cent reduction, and in view of the economic conditions the reduction was accepted gracefully.

At the Grant Motor Car Co. there has been no reduction in the pay of old employees with the exception that the 10 per cent bonus has been taken off. All new men hired are taken on at 10 per cent less than the rates paid the old employees of the company.

## \$637,500,000 in Fund For 1921 Road Work

Total Available for Highways  
in 48 States Doubles Panama  
Canal Cost

NEW YORK, Jan. 17—For public highways—\$637,500,000.

This is the staggering total available in the 48 States of the Union for expenditure this year on road construction. The total includes Federal, State and county appropriations. This amount is nearly 50 per cent more than was spent in ten years in building the Panama Canal and nearly six times as much as New York State spent on its great barge canal.

The amount is the largest ever made available in any one year for road building, and it is believed that with materials lower in price, labor plentiful and transportation normal, the mileage of construction will surpass any previous mark. A quarter of the total comes out of the Federal aid fund, and this source of supply will be exhausted by the beginning of 1922 unless additional funds are provided by Congress, which is not likely at this session which has "economy" as its slogan.

With such an enormous amount to be used in road building, the various agencies interested in improvement of highways are actively concerned in having it expended wisely and economically. The main purpose is to have the roads built where they will do the most good and carry the most traffic. The subject of substantial and economical construction is next in importance. One of the important factors in lower costs is found in the fact that labor is not only plentiful but cheap. Common labor for road building is available in some of the Southern States at \$1.50 a day.

## Army Planes to Fly Cross Country in Day

WASHINGTON, Jan. 17—The Chief of Air Service, United States Army, officially announced that on Feb. 22, 1921, an attempt will be made to cross the United States by airplane within a period of 24 hours.

The route chosen extends between Florida and Southern California. The starting point in Florida will be Pablo Beach, Jacksonville, and the starting point in Southern California will be San Diego. The former point is within the 8th Corps Area and the latter point is within the 9th Corps Area. The distance flown will be 2079 miles. There will be two participants in this flight. Lieut. Alexander Pearson, Jr., will take off from Pablo Beach, Florida, making the flight in three hops; from Jacksonville, Florida to Ellington Field, Houston, Texas, 804 miles; from Ellington Field to El Paso, Texas, 660 miles; from El Paso to Rockwell Field, San Diego, Cal., 615 miles. The participant from San

Diego, whose name has not been announced, will reverse this schedule, making the flight on the same day.

It is believed that this flight will produce records of performance which will be of extreme interest in the furtherance of both commercial and military aeronautics and will be the first in history in which the United States has been completely traversed in so short a period of time.

## Trucks to Be Shown at Tractor Exhibit

COLUMBUS, Jan. 15—After considering the question for some time, the executive committee in charge of the National Tractor Show, which will be held at Columbus, Feb. 7 to 12 inclusive, has decided to admit trucks to the exhibits. This action was taken at a meeting of the executive committee in Chicago recently when the Columbus committee made such a recommendation. Attending the meeting were W. J. Longbon, chairman of the local committee and E. E. Whaley, manager of the show.

The space to be allotted to truck manufacturers will be plotted in the near future and contracts for space will be closed. This space is somewhat limited, although very desirable and is located in the Coliseum, which is the central building used for the show. There will be space for from 30 to 50 trucks.

This action of the committee meets with the approval of many people who have urged that trucks, especially those used for farm work be admitted to the show. It was urged that since the teachings of the show is the motorization of the farm, trucks could not be excluded.

## Army Develops Machine to Test Brake Linings

WASHINGTON, Jan. 17—The Engineering Section, Motor Transport Division, in connection with the Bureau of Standards, has developed a machine for testing brake-lining. Manufacturers of brake-lining who may be interested are requested to send ten feet of ¼ x 2-in. of their standard lining to the Motor Transport representative at the Bureau of Standards. These samples are to be sent by Parcel Post, prepaid, and addressed to R. B. Burton, Motor Transport Representative, Room No. 238, Industrial Building, Bureau of Standards, Washington, D. C. Any communications regarding the tests should be addressed to the Motor Transport Depot, at Camp Holabird, Md.

## RENTZ SPARK PLUG FORMED

ATLANTA, Jan. 17—The Rentz Spark Plug Co., manufacturers, has been organized and incorporated in Atlanta with \$500,000 capital, by W. C. Rentz, P. H. Orr, Asa G. Candler, Jr., John S. Hurt and George D. Webster. The company will establish a large plant here for the manufacture of the Rentz spark plug, invented by W. C. Rentz.

## New York Road Plan To Increase Car Tax

Responsibility for Maintenance  
Means Addition of \$1,000,000  
to Present Rates

NEW YORK, Jan. 17—Through the placing of responsibility for the maintenance of New York State highways solely upon motor vehicle owners, as advocated by Governor Miller and as expected to be approved by the Legislature, an additional burden of at least \$1,000,000 in taxes will devolve upon owners. This is the estimated difference between road upkeep expense and the present return from motor vehicle sources.

Legislative sanction will be accorded the plan outlined by Governor Miller in his first message to the lawmakers, according to Senator Charles J. Hewitt, who has been named chairman of the Senate Finance Committee.

"A slight increase in horsepower rates on each passenger car will make up the required revenue," Senator Hewitt said. "I also believe that motor trucks should bear their part in the contemplated increase in proportion to that saddled upon passenger car owners. Trucks have never borne their share of the motor vehicle tax."

During 1920, automobile owners paid about \$9,000,000 to the State for licenses, etc. One-fourth of this was turned back to counties, as provided by law, for county road work. About \$7,500,000 was spent by the State Highways Department in maintenance work. Maintenance for the fiscal year had been estimated at \$15,000,000, but this will be reduced by the Legislature in view of the proposed method of raising the fund.

## YOUNGSTOWN CARRIAGE SOLD

YOUNGSTOWN, Jan. 17—Sale of the buildings, land and fixtures of the Youngstown Carriage Co., to the Henderson-Overland Co., has been completed. The price was about \$300,000. Possession will be given to the purchaser April 1. The Youngstown Carriage Co. sold Studebaker passenger cars and Federal trucks. These lines have not been placed with new representatives. The Henderson-Overland Co. is distributor for the Willys-Overland line of passenger cars, the Handley-Knight, and the Garford truck. It will continue these lines.

## PUMP COMPANY RESUMES WORK

FORT WAYNE, IND., Jan. 17—Operations at the Wayne Oil Tank & Pump Co. were resumed today with about three-fourths of all the employees on duty. About 150 workers will continue to remain idle until repairs and moving of machines at the plant are completed. It is expected that these workers will be given employment in a short time. The company manufactures tanks and storage systems for filling stations, etc.



## Tractor Show Topics Cover Many Points

### Noted Experts on Agriculture to Speak to Farmers at Columbus Exhibit

COLUMBUS, Jan. 17—The most comprehensive educational program ever arranged for a large gathering of American farmers will be the main feature of the coming National Tractor Show, which will be held in Columbus Feb. 7 to 12 inclusive. Farm problems of every kind and every phase of tillage of the soil will be touched upon during the show in the educational program. Methods of handling, caring for and repairing farm machinery will also be touched upon at the meetings.

The men selected to explain the various farm questions are authorities in their lines. One of the speakers will be F. I. Mann, of Gilman, Ill., a brother of Congressman Mann on "Soil Conservation," Hammond Olney of St. Joseph, Mo., editor of "Power Farming," will speak on "Adapting the Farm and Farm Business to Power Farming."

"Factors Which Determine the Type and Size of Tractor to be Purchased" will be explained by I. W. Dickerson, Charles City, Iowa, editor of the Agricultural Engineer. "The Modern Trend of Tractor Design," is the subject to be treated by J. B. Davidson of the Iowa State College, Ames, Iowa. Prof. O. W. Sjogren of the College of Agriculture of Lincoln, Neb., will talk on "Ignition Troubles and Their Remedies." "Tractor Hitches" will be explained by Prof. Daniel Scoates of A. & M. College, College Station, Texas.

Two Ohio State University professors will be on the program. They are G. W. McCuen and F. W. Ives. The former will lecture on "Lessons to be Learned from a Tractor Survey in Ohio" and the latter on "Housing the Tractor and Tractor Tools."

Purdue University is sending Professor William Aikenhead who will talk on "The Tractor and Belt Power" and Pennsylvania State College is sending Prof. R. U. Blasingame to talk on the "Advisability of Purchasing Tractors and Tractor Tools in Community Groups." F. W. Duffee, a former student at the Ohio State University will explain "Laying off the Field for Plowing." Practical farmers will also be on the program and it is planned to have general round-table discussions of all questions pertaining to farming and tractors.

### DART TRUCK NAMES OFFICERS

WATERLOO, IOWA, Jan. 17—The following officers have been elected by the directors of the Dart Truck & Tractor Corp., President, C. C. Wolf; vice-president in charge of engineering, W. H. Johnson; vice-president in charge of sales, M. D. Herron; secretary, G. J. Bondurant. The company still is in limited production but reports showed that prospects are bright for 1921.

## ROLLS-ROYCE TOASTS FIRST AMERICAN CAR

SPRINGFIELD, MASS., Jan. 17—A dinner was given by the officers of Rolls-Royce of America, Inc., to the foremen and heads of departments to celebrate the completion of the first chassis built in the plant here under English supervision. The chassis now on test is American built even to the radiator. Preliminary operations were begun at the American works on July 12 and have been almost constantly under way since that time. The company now has on hand in this country more than \$1,500,000 worth of unfilled orders. The dinner was attended by about 50 of the English experts in charge of production. L. J. Belnap the president, was toastmaster.

## Elwood Company Formed to Build New Tractor

MADISON, WIS., Jan. 15—Production on a new design of two-wheel tractor will shortly be started by the Elwood Tractor Co. of this city. The designer is C. D. Elwood, who has long been connected with the farm machinery business, having represented the McCormick company, Parlin & Orendorff and the American Seeding Machine Co. in Canadian territory. In 1908 he was with the Hart-Parr Co. In the fall of 1914 he began a course of study in mechanical engineering at the University of Wisconsin.

The Elwood machine is similar in appearance to the Moline Universal and the Allis-Chalmers small model. Development work on the tractor has been going on four years and the last model built is the ninth. Madison has not yet been definitely selected as the location for the factory.

The officials of the company are W. H. Heddles, president; C. D. Elwood, vice-president; H. A. Burd, secretary and treasurer.

### LEONARD BUYS HEGGIE PLANT

GRIFFITH, IND., Jan. 17—Leonard Tractor Co. of this city, has purchased the James C. Heggie & Sons Co. plant in Joliet, Ill., and will manufacture a four wheel drive farm tractor. The plant at Griffith will be removed to Joliet at once and it is hoped to start production early in the spring. H. M. Leonard, inventor of the tractor, is president and general manager of the company. His headquarters are at Gray, Ind., and he was formerly connected with the Jackson Automobile Co., and also was special engineer with the Lewis Truck Co. In 1914 he designed a truck for the Duplex Truck Co. F. E. Parks and A. A. Parks, both of Joliet, are interested in the company and will assist in the financing. John Hurlburt of Gary, Ind., is secretary-treasurer. When in full operation the plant will produce five machines per day.

## Maxwell Concurs in Creditor's Suit

### Petition Filed by Jenks & Muirs in Suit for \$6,064 Accepted by Company

NEW YORK, Jan. 18—The Maxwell Motor Co., Inc., has concurred with petitions filed by the Jenks & Muirs Mfg. Co. of Detroit for an injunction restraining creditors from interfering during the pendency of a suit for the recovery of \$6,064 as well as for the establishment of claims of creditors and assets. The action was filed in United States District Court in Detroit.

In the bill of complaint the manufacturing company states that about 150 other creditors hold claims against the Maxwell company. These claims approximate \$4,000,000, the petition states, and it is added that other indebtedness in the form of loans brings the company's total liabilities to \$16,000,000.

The petition states that the Maxwell company has assets aggregating more than \$25,000,000 but that this cannot be converted into cash at this time without great loss. The plaintiff contends that the immediately realizable assets of the Maxwell company are not sufficient to meet the claims of creditors.

There has been considerable speculation as to why the company has concurred with the petition, but no statement has been forthcoming from the management committee which recently declared operative the plan for a consolidation of the Maxwell and Chalmers company. Not all the stock of the Maxwell company has been deposited under this plan. It is understood there are outstanding about 20,000 shares of the second preferred stock and about 31,500 shares of the common stock.

Persons familiar with the affairs of the Maxwell company believe it possible that this suit may be designed to force the owners of the outstanding stock to give their consent to the plan under penalty of being excluded entirely from its benefits. It is not believed the suit will have any effect upon those stockholders who have assented to the plan.

### BERGOUNGAN COMPLETES PLANT

TRENTON, N. J., Jan. 14—Construction work has been completed on the new factory units undertaken several months ago by the Bergougan Rubber Corp. and it now has one of the most modern and complete tire plants in the East. The work was continued notwithstanding the slump in the tire market. The plant will produce pneumatic tires for passenger cars, motor trucks and motor cycles as well as inner tubes for its tires. The company has invested several hundred thousand dollars in enlarging the factory, machine shop and storage facilities. Provision has been made for the comfort of the employees and the new building includes an up-to-date cafeteria.

## Congress Considers Revision of Tariff

### N. A. C. C. Committee Heads Show Possibilities of Foreign Trade Development

WASHINGTON, Jan. 14—Establishment of a uniform tariff rate of 30 per cent on automobiles and a national policy of reciprocal relations were advocated to-day by J. Walter Drake, chairman of the foreign trade committee of the National Automobile Chamber of Commerce at a hearing before the House Ways and Means Committee. The proposal for a revision of the tariff downward and reciprocity aroused great interest in Congress because practically all other industries were demanding higher rates as a protection against foreign competition.

Though it is quite too early to predict the action of the Ways and Means Committee, indications were that the Committee had been impressed with the proposition that the tariff duty on the higher priced cars should be reduced from 45 per cent to a basis of 30 per cent, which now prevails for the lower priced automobiles. Drake made it clear that the revenues would not be reduced as a result of this proposed cut in rates, but on the contrary, would stimulate importations of the higher priced automobiles.

"The imports of high-priced cars during 1920 amounted to 6 per cent," Drake said, "and those of lower priced motor vehicles to 94 per cent of total automobile imports. According to numbers there were 50 high-priced and 654 low-priced cars. The revenue from the former was \$99,305 and \$153,986 from the latter.

"The smaller number consisted of automobiles selling in the country of origin at more than \$2,000.

"Reason for smaller imports of that type of vehicle may be ascribed to higher United States duty. With a uniform duty of 30 per cent, however, the imports of higher priced cars will proportionately increase, and consequently result in higher revenue. Despite the fact that this measure may directly affect their interests, American manufacturers of high-priced cars are adherents to this policy, believing it of general benefit.

#### Can Change with Conditions

He pointed out, however, that the present recommendations have to do only with existing economic conditions and does not necessarily foreclose the automotive industry from advocating a rearrangement as conditions warrant.

According to the chairman of the N. A. C. C. foreign trade committee, stabilization in the industry must be brought about by the cultivation of foreign markets.

"At the present time," he said, "the export trade is considerably hampered by great depreciation in foreign exchange. To afford manufacturers in

countries with depreciated currency opportunity to sell their products in the United States will tend to right this condition. Although it is fully realized that the increased imports of automobiles, even if the duty on high-priced cars is reduced, will not be such as to materially improve the exchanges, still even minor influences of this kind, if multiplied in other trades that will not be greatly affected thereby, are certain ultimately to bring about the desired results."

Chairman Fordney manifested considerable interest at the mention of the retaliatory measures adopted by the French last summer. Various committee men questioned the witness about this phase of foreign trade of the automobile industry.

#### Cites Action by French

That favorable results from a uniform duty may be expected, it was said, is shown in the action of the French automobile manufacturers, who informed their government that the English, Belgian, Italian and French syndicates had collectively voted for a uniform tariff of 33-1/3 per cent. This duty was to apply to all automobiles imported into and from any of the countries that entered into the agreement. The French Ministry, however, cited the United States tariff of 45 per cent on automobiles of over \$2,000 in value, and fixed the French duty at that rate on automobiles of the type most exported from the United States. It also added that a further reduction may follow if American duty should later be reduced.

The Committee was informed that American cars represent the greatest value for every dollar of cost. Statistics were submitted showing the differences in prices and horsepower of representative American and foreign machines. The data stressed the fact that the advantage remained with American manufacturers.

Drake further contended that reciprocity was essential for the expansion of American foreign trade. He stated that a uniform rate and reciprocal relations would stimulate trade in that the rate would apply to motor vehicles from such countries only as grant equality of treatment for American products.

As to the advantages of reciprocal measures, the committee was advised that wherever countries discriminated against American trade, there should be applied additional duties to be determined by law or expediency. Drake suggested that the President should have the power to ascertain what countries discriminated against the United States in tariffs and take protective measures.

#### Aluminum Tariff Opposed

Opposition of the automotive industry to proposed increases in tariff duties on aluminum, was made known to the Ways and Means Committee by G. A. Bauer of the N. A. C. C. foreign trade committee. He declared that automobile manufacturers were the largest individual users of aluminum and higher tariffs would mean adoption of cheaper substitutes.

## Treasury Revises Excise Tax Clauses

### Change in Computing Retail Tax —Define Overpayments— Simplify Export Rulings

(Continued from page 137)

can be manufactured only for such dealer or jobber and that it will be sold by such dealer or jobber as the manufacturer, the dealer or jobber is held to be the manufacturer for the purpose of the tax.

Revision of Article 34 allows the manufacturer who sells both at wholesale and retail to arrive at the basis of tax with respect to retail sales. The law provides that in such a case the manufacturer may base the tax on a retail sale on the price for which like articles are sold by him at wholesale. The revised regulations permit the manufacturer to arrive at this average by taking his actual wholesale sales for a given month and using this average until such time as his records show a material change.

Article 41 has been amplified to define in detail the difference between an "overpayment or overcollection" as distinguished from an "illegal or erroneous" payment or collection. The law permits a taxpayer to take credit for an overpayment or overcollection whereas an illegal or erroneous payment or collection must be recovered through a claim for refund of the excess payment.

Articles 42 and 43 have been practically rewritten with a view to simplifying them. Under Regulations 47, Revised, an article is regarded as having been sold for export if the manufacturer has in his possession at the time title passes or of shipment an order or contract of sale or document incidental thereto, or a certificate from the purchaser to the effect that the article is to be exported prior to use, re-sale, or further manufacture in the United States. This is held sufficient proof that the article in question is sold for export and provides temporary exemption from the payment of tax for a period of six months.

#### Must Submit Proof of Export

Before expiration of this six months period in order to establish the fact that the article in question has been exported in due course it is necessary for the manufacturer to have in his possession certain proof of exportation, which shall consist of a certificate of exportation filed with the manufacturer by the purchaser or in the case of a direct exportation by the manufacturer, of a copy of the export bill of lading or a certificate of the export carrier showing exportation of the article. Where such proof of exportation is not furnished within such period of six months it is necessary for the manufacturer to pay the tax on the article in question, and if subsequently the proof of exportation in due course is furnished, the manufacturer may make claim for refund of the amount of tax so paid.



## Truck Sales Backed by New Corporation

**Manufacturers Trust Organized  
in Chicago with \$10,000,000  
Capital to Aid Dealers**

CHICAGO, Jan. 15—As a solution of the financing problems of the motor truck manufacturers on which David Thomas, general manager of the Motor Truck Manufacturers Association, has been working for some time, the Manufacturers Trust, a \$10,000,000 finance company, has been organized here with Col. C. R. Vincent of the Vincent Trust of this city as president.

Although the company has been formed largely through the instrumentality of Thomas as general manager of the association, his aim being to obtain "methods of financing that would be sound and flexible enough to meet all the requirements of the motor truck manufacturer who is conducting his business on a sound safe basis," it is in no way connected with the Motor Truck Manufacturers Association itself.

The methods by which the Manufacturers Trust hopes to attain its purpose of meeting the reasonable financial requirements of the motor truck business from the manufacturer to the user are co-operative but the amount of stock the manufacturer may purchase has been limited to \$15,000 or 1500 shares of a par value of \$10. This has been due to the feeling that the manufacturer can well use his money in the manufacturing end of his business and that to require him to place a large amount in a finance company to finance his time sales would be like requiring him to "raise himself by his own boot straps."

The finance committee of the company, which passes upon the soundness of every undertaking, is composed entirely of bankers so that no partiality may be shown the manufacturers who may be stockholders in the company.

The position of the dealer is explained in this wise:

### Dealers Afforded Wide Benefit

"The local bank is the corresponding bank which passes on any transaction between the local dealer and the user involving the Manufacturers Trust, this, of course, with a complete knowledge of the methods and policies of the Manufacturers Trust. In this way the local dealer wherever he may be located is afforded the benefits of a local finance company plus the facilities of a big company doing business nationally.

"The dealer of the manufacturer who has stock in the Manufacturers Trust is encouraged to buy a small amount of stock in the Manufacturers Trust more as evidence of good faith than anything else, unless it be the stabilizing influence that the convention might have upon the dealer himself and the closer relationship which this investment encourages between the dealer and the manufacturer."

## TO OPERATE TRUCKS ON RAILWAY TRACKS

WINCHESTER, VA., Jan. 15—The Winchester & Western Railway Co., whose line from this city to Wardensville, W. Va., is almost completed, has successfully worked out a plan whereby powerful motor trucks, equipped with flanged wheels will be used instead of steam locomotives.

The passenger and freight trains will be shorter than those usually hauled by steam power, but there will be more trains. Practical tests recently made with a small automobile led the officials of the company to experiment with powerful trucks, and the scheme has been found to work admirably. Trains will be running into Wardensville within a month, it is declared. That town has assumed a "boom" atmosphere.

## Studebaker Produced 52,000 Cars in 1920

SOUTH BEND, IND., Jan. 17—The Studebaker Corp. turned out 52,000 motor cars in the year ending Dec. 31. Its best previous production was 38,300 cars in 1919. The company reports that the total of unsold cars on hand is only 1600 or about two weeks supply. Both the South Bend and Detroit factories have resumed operations on the basis of an output of 800 cars a week equally divided between the two plants. The company will devote its efforts exclusively to the manufacture of automobiles, having disposed of its old farm wagon business to the Kentucky Wagon Co. of Louisville, with the right to use the Studebaker name for two and a half years.

## Nash Boosts Output to 40 Cars Daily

KENOSHA, WIS., Jan. 14—Former workmen to the number of 2000 have been re-employed by the Nash Motors Co., which has been operating with a greatly reduced force. Its output is now forty cars daily, and it is planned to return to normal as quickly as conditions warrant it.

## DUTY MOTORS TO MAKE TRUCK

CHICAGO, Jan. 15—The Duty Motor Corp., which has been incorporated for \$500,000 under the laws of the State of Illinois, is manufacturing a 2-ton capacity truck which sells for \$1,490, and is contemplating the erection of a large factory in the early spring in Greenville, Ill., to increase production. The following have been elected officers of the corporation: President, W. H. Ruther; vice-president, W. J. Gubser; secretary-treasurer, J. P. Snowden, and sales manager, Paul Harnetiaux.

## Half of Car Sales on Part Time Basis

**Acceptance Corporation Statistics  
Show Necessity of Credit—  
Farmers Aided Most**

NEW YORK, Jan. 17—Statistics gathered by the General Motors Acceptance Corp. through the issuance of a questionnaire to dealers show that between 45 and 50 per cent of all automobiles being sold in the United States today are marketed on some deferred payment system. This is considered the first authoritative figure issued covering this difficult point. The replies from dealers covered sales of 149,136 cars of which 69,729 were sold on time.

The period for which the questionnaire asked information was that from Aug. 1, 1919, to July 31, 1920, and therefore includes the latter half of a summer selling season, the following fall, winter and spring seasons, and the first half of the succeeding summer. Selling conditions over a full yearly cycle are thereby exemplified.

City dwellers paid cash more frequently than farmers, only 44.9 per cent of urban sales being on credit arrangements, while 48.2 per cent of new cars delivered to farmers were on time. On trucks 53 per cent of those sold in cities were financed while 59.9 per cent were financed of those sold to farmers. Maximum time allowed to city dwellers on deferred payment sales averaged 9.3 months and to farmers, 11.1 months. The average down payments on all deferred payment sales was 40.3 per cent of the cash selling price.

Commenting on the statistics, the corporation asserts that by more intensive use of deferred payment facilities the automobile industry may be able to increase its sales by approximately 25 per cent. This is based on the estimate by economic experts that 25 per cent of the industry's production always will be sold for cash.

## Bankers Take Over Control of McGraw

(Continued from page 138)

of plant executives. The McGraw Tire and Rubber Co., was organized in 1910 and until the present time it had been prosperous, paying to stockholders approximately 88 per cent in cash dividends and 86 per cent in stock dividends. The present capitalization is \$2,500,000 of preferred stock and 100,000 shares of no par value common.

The action taken is expected to strengthen the position of preferred stockholders, assure a vigorous and businesslike management and the prediction was made that the company will come through O. K. E. S. McGraw, one of the organizers and for many years head of the corporation died a year ago and Morgan succeeded him as President.

## Unsecured Creditors Delay Goodyear Plan

### Highly Optimistic Reports on Rehabilitation of Company Considered Premature

NEW YORK, Jan. 19—Conferences of representatives of the various banking groups which are interested in the reorganization of the Goodyear Tire & Rubber Co. are being held here almost daily, but one of the leading factors in the refinancing program declared to-day it was impossible to forecast accurately what the result would be, although everyone concerned was hopeful a solution satisfactory to all would be worked out.

Highly optimistic reports, which have been current in financial circles the past few days, are somewhat premature. The chief stumbling block to the success of the negotiations is the attitude of the merchandise creditors. A large banking house has agreed to underwrite an issue of first mortgage bonds which it has been proposed to issue for the further protection of secured creditors. In connection with this proposal is another to issue junior securities in the form of 20 year debentures and first preferred stock to the unsecured creditors. This plan is not satisfactory to a large proportion of those to whom bills for merchandise are payable. It is intimated, however, that unless this offer is accepted the only alternative is a receivership under which the merchandise creditors would have to take what they get.

Several new banking houses have been brought into negotiations, including J. P. Morgan & Co., and bankers who are interested in other tire companies are lending their aid because of the sincere desire to keep Goodyear out of the courts. It is realized that a receivership would have a bad psychological effect upon the entire industry.

Most of the conferences are being held in the offices of Paul D. Cravath, and they are being attended by bankers not only from New York but from Cleveland, Pittsburgh, Chicago and other cities. Among the participants are Charles H. Sabin of the Guaranty Trust Co., and James S. Alexander of the National Bank of Commerce of this city.

A definite decision must be reached before Feb. 15, when Goodyear must pay \$18,000,000 to the banking syndicate headed by Goldman, Sachs & Company.

### G. M. TRUCK INCREASES OUTPUT

PONTIAC, MICH., Jan. 17—At the present time the General Motors Truck Co. in Pontiac is employing more than half of the normal working force and the number of men will be increased steadily as conditions warrant it. According to general manager, W. L. Day, the company will probably be in production on its five models in March. Production is now about nine a day on one light truck and in February production will be started on a second light truck.

## Report Vim Bought by Standard Steel Car

PHILADELPHIA, Jan. 19—The Vim Motor Truck Co. has been reorganized and taken over by responsible financial interests. No announcement has been made as to the details of the transaction but it is understood the company has been purchased by the Standard Steel Car Co., which has plants at Butler and New Castle, Pa., and Hammond, Ind.

The Vim company resulted from a reorganization in 1915 of the Touraine company, which produced the Vim delivery cars. The company has devoted itself to the manufacture of commercial vehicles.

## G. M. C. Makes Changes in Executive Personnel

NEW YORK, Jan. 17—At a meeting of the directors of the General Motors Corp. last Thursday, the resignation was accepted of W. C. Durant as a member of the finance committee and as a member and chairman of the executive committee.

The executive committee was designated as follows: P. S. du Pont, chairman; J. J. Raskob, J. A. Haskell and A. P. Sloan, Jr.

The resignation was accepted of F. W. Hohensee as a director, vice-president and member of the executive committee.

F. D. Brown was elected a member of the finance committee.

C. F. Kettering was elected a vice-president. A. H. Swayne was elected a director and vice-president.

## Lewis Named Chairman of Tire Maker's Section

NEW YORK, Jan. 19—The tire manufacturers division of the Rubber Association of America has elected as its chairman Seneca G. Lewis of the Pennsylvania Rubber Co. and Joseph C. Weston of the Ajax Rubber Co., vice-chairman.

H. J. Zimmerman of the B. F. Goodrich Co., has been elected chairman of the traffic committee of the Rubber Association with A. D. Phillips of the Fisk Rubber Co., as vice-chairman.

C. W. Wilson of the Dural Rubber Corp. has been made chairman of the foreign trade division, with R. H. Daniels of Goodyear, as vice-chairman.

### SIMPLEX RE-NAMES OFFICERS

CADILLAC, MICH., Jan. 17—The Simplex Wire Wheel Co. has re-elected the old board of directors and officers: President, J. P. Wilcox; vice-president, W. E. Curry; secretary-treasurer, J. C. Ford. The other directors are J. B. Wagner, W. A. Kyser, C. B. Smith, C. A. Saunders, George J. Sandel and C. F. Williams. The concern was formerly the Kolben Wheel Co., Detroit.

## Interlocking Tire in Receiver's Hands

### Stockholders and Minor Officers Join in Petition Alleging Mismanagement

AKRON, Jan. 15—Elihu Harpham, prominent Akron real estate operator, to-day took charge of the affairs of the interlocking Cord Tire Co. of Akron and Mogadore, following his appointment as receiver by Judge W. I. Ahern in Common Pleas court, on petition of several stockholders and minor officers of the company. They charge mismanagement and alleged fraudulent work upon the part of certain officials of the company. This petition is signed by shareholders, including E. E. Ammons, vice-president of the company; Walter G. Scott Herman; Gustave J. A. Gibson and W. Dorn.

The petition contains the allegation that the company attempted to buy real estate in Mogadore for its new plant without legal action upon the part of its directors and that the value of real estate is carried on the books at \$38,000 while only \$16,000 was paid. Charges also are made that bills and accounts receivable are listed at over \$63,000 while not more than \$30,000 can be actually realized on them; that the company's books show products valued at \$100,000 while the actual value thereof will not exceed \$50,000 and that the company is delinquent to the extent of \$8,000 in payment of wages and salaries to employees.

The petitioning shareholders further charge that officers of the company have received rebates on contracts awarded for construction of company buildings and that they have spent approximately \$115,847 as commissions on sale of stock. The company recently completed a new plant at Mogadore. The firm is capitalized for \$1,000,000 of which \$310,000 remains unpaid on subscription lists.

Walter Kline is president of the company.

Harpham was directed to-day to conduct an immediate audit of the company's books to determine the exact amount of assets and liabilities. The plant at Mogadore has been closed for several days due to shutting off of power by the Northern Ohio Traction and Light Co. through failure of the company to contract for power, the shareholders charge in their petition.

### BULL TRACTOR REGAINS FUNDS

INDIANAPOLIS, Jan. 19—At a hearing held Jan. 12 before Harry C. Sheridan, referee in bankruptcy in the case of the Bull Tractor-Madison Motors Corp. of Anderson, the Royal Indemnity Co. of New York was ordered to pay to Fred Dickson, trustee of the corporation, \$15,000 deposited with it at the time the Bull Tractor Co. and the Madison Motors Co. were consolidated. The money was deposited by the tractor company to cover any revenue taxes incurred by the Madison company before the consolidation.



## INDUSTRIAL NOTES

**Automatic Products Corp.** has succeeded the Tock Screw Machine Products Corp., taking over its assets and assuming its liabilities. There will be no change in personnel and the business of the company will be carried on as heretofore.

**Robertson Resilient Wheel Corp.**, New York, has taken a long lease on space in the Armour Postal Station Building, Chicago, and will occupy it as general office of the company, about Feb. 1.

**Mercury Body Corp.** has been organized at Louisville, Ky., to build automobile bodies. A plant soon to be built will have a capacity for 6000 bodies a year, constructed under a new process.

**Duesenberg Automobile & Motors Co.** plans for the Indianapolis factory have been approved by Fred Duesenberg, vice-president and engineer, and construction will soon begin.

**Cleveland Tractor Co.** has opened a district sales office in St. Louis with S. C. Mitchell in charge. Territory covered borders the Mississippi from Illinois to the Gulf.

**F. D. Wilson** has been elected president of the Wilson Tractor Co., formed by him to build tractors at Ottumwa, Iowa. He was formerly with Deere & Co.

**American Power Shovel Co.** has removed its offices from Chicago to Milwaukee, where the main manufacturing activities of the company are centered.

**Port Houston Tire & Rubber Co.**, Houston, Texas, has taken over the plant and property of the Universal Tire & Rubber Ass'n.

**Master Rubber Co.**, Dayton, Ohio, has resumed operations with its full force of employees after a six-week layoff.

**Sewell Cushion Wheel Co.** showed an increase in business in 1920 of 61 per cent over the previous year.

**Automatic Safety Tire Valve Corp.** beginning Feb. 1 will handle sales direct from its New York office.

**Pioneer Truck Co.**, Chicago, has had plans prepared for a \$500,000 factory building at Valparaiso, Ind.

**Willys-Overland Co.** will re-open the Toledo plant Feb. 1 on a schedule based upon current sales.

## Advertising Clubs Rap

## Wizard Car Advertising

NEW YORK, Jan. 18—Advertising of the Wizard Automobile Co., Charlotte, N. C., is branded as a flagrant offense against truth by the national vigilance committee of the Associated Advertising Clubs of the World, in a special bulletin issued here. The bulletin asserts that the company claimed enormous profits before a single car was produced and that a large outlay for factory and equipment was made before the design of the car was perfected.

A concern known as the Manufacturers' & Exporters' Alliance, which the Wizard company is reported to have said would take presumably 10,000 cars in 1921, was investigated by the vigilance committee and it declares it found no ground for great confidence in its financial responsibility. Charles F. Hamel, said by the vigilance committee to have

been president of the Cyclomobile Co., Toledo, is declared by the committee to be sales manager of the Wizard company.

F. W. Edwardy, Sr., president of the company, is asserted by the vigilance committee to be a professional promoter with no experience in manufacturing automobiles. F. W. Edwardy, Jr., secretary and treasurer, is found by the committee to be unknown to officers of the Packard and White companies, with whom, it is asserted, he claimed previous employment.

Dodge Officers Named  
to Higher Positions

DETROIT, Jan. 17—While officials of the Dodge Bros. do not yet know when the plant will be re-opened, it is nevertheless expected that an announcement will be made within the next few days. It is very possible that the company will again be in production sometime during the first few days in February.

Further promotions have been made among officials of Dodge Bros. Arthur T. Waterfall, who was assistant general manager, retains this title and becomes also vice-president of the company. Harry V. Popeney has been made secretary and Reginald J. Fry assistant secretary. C. W. Matheson, who was acting general sales manager, is now made general sales manager.

The board of directors of the company is now made up as follows: Howard B. Bloomer, chairman, and Frederick J. Haynes, Arthur T. Waterfall and John Ballantyne.

Truck Line to Carry  
Crops to Los Angeles

NEW YORK, Jan. 17—Results of an experiment in motor transport service which is to be undertaken by the recently formed California Rapid Transit Co. on the Pacific Coast are being awaited with interest by motor truck circles. The company plans to operate a fleet of twenty Mack trucks in the Los Angeles Valley on four routes covering the entire fruit and produce belts in this territory. The trucks are to be specially built to carry fruit, vegetables, milk and merchandise of various sorts.

The routes projected are from Los Angeles to Redlands, from Los Angeles to Mecca, from Los Angeles to Alessandro and from Los Angeles to San Bernardino, with stops at all intervening towns and cities. It is expected that trucks will be in operation by July.

## RAMBLER TIRE RECEIVER NAMED

NEW YORK, Jan. 19—Federal Judge Hand has appointed receivers for the Rambler Tire & Rubber Co. in a suit brought by a creditor with a claim for \$3,500. The company was organized under Delaware laws in 1920 to manufacture tires and rubber goods. Its liabilities are \$28,872 and its assets \$60,690. It is asserted that the company is solvent but that it has no working capital and is unable to meet current obligations.

## METAL MARKETS

IN some of the markets for raw, semi-finished and finished metal products the buyer is once more confronted with a dual set of prices. The disparity in prices this time is not between producer and producer. There is one market for iron and steel and most of the non-ferrous metals in which the buyer with the requisite ready cash wields the power of an autocrat. This is the market for material now ready for delivery and eating up warehouse space and interest on the value it represents. The other market is that for material which must first be produced. In the latter sellers' views as to what prices they must obtain, in order to make both ends meet, are firm as compared with the former. It was reported in the trade the other day that a sales agency offered 5000 tons of No. 2 plain foundry iron at a furnace base of below \$30 a ton, without being able to find a taker. This was, by no means, "resale" iron, as that term is commonly understood. The holder was to all intents and purposes the producer who, in all probability, would have balked at booking an order for a similar tonnage at below \$30, if he had to undertake production of the iron in the course of the next few weeks. It was also reported that a producer had sold 1000 tons of sheet bars at \$45.50, or \$1.50 a ton below the Corporation's price. Undoubtedly this "cut" price applied to a specific tonnage all ready for shipment which the producer was anxious to turn into cash. There are no indications that independents are disposed to pare the Corporation's price levels on material that must first be made. With the possible exception of lead, all non-ferrous metals can be bought cheaper for spot than for deferred maturities. In other words, there is a very pliable price for pig iron, metals and steel products that producers are now holding pending the appearance of buyers, and there is another set of prices for future production. The latter is not so easy to be budged as the former. Then, of course, there is, in addition, a certain amount of actual "resale" material in the keeping of "second hands," but the latter tonnages are comparatively light. That automotive purchasing agents are rather apathetic is to be seen from the fact that the pleas of American aluminum and alloy steel producers for higher import tariffs is not causing any haste to cover anticipated requirements at present price levels.

**Pig Iron**—Quotations in the trade press are far from being a guide to prices at which sizable tonnages can be obtained. Individual negotiations govern in each case. Most buying, however, is in carload lots.

**Steel**—A somewhat better demand for cold finished steel bars is ascribed to improvement in the automotive industries. The market for hot and cold rolled strip steel is steady. Fresh sheet buying is of light proportions.

**Aluminum**—Foreign metal is still offered at 25 per cent below the reported spot price of the producer of American virgin. So far the possibility of an advance in the market through increased import duties has not engendered any buying activity.

**Copper**—Prediction of an 18c. market by the sales manager of a leading interest is taken no more seriously than was that made, last year, by John D. Ryan when he prophesied the return of 23c. copper. Much of the surplus is being taken off the market, however, by exports.

## FINANCIAL NOTES

**Fisher Body Corp.** proposes to issue five shares of new common stock of no par for each share of present stock and to increase its common stock by an amount sufficient to make the exchange for Fisher Body Ohio Co. stock. The corporation will give one of its no par common shares for each common share of the Ohio company plus \$2.50 in cash, provided at least 40,000 of the 45,000 shares publicly held accept the offer. The Fisher company already owns 55 per cent of the Ohio company common stock. The corporation will then guarantee full payment on the Ohio company preferred stock by July 1, 1922, of all accumulated dividends to Jan. 1, 1921 and quarterly dividends to July 1, 1922.

**Packard Motor Car Co.** directors have deferred payment of the common stock dividend usually payable Feb. 1. F. R. Austin, secretary, said the company's accumulated surplus and cash position warranted payment but the deferment was decided upon in view of the disturbed business conditions.

**Root & Van Dervoort Corp.** has reduced its liabilities by \$1,000,000 since July and for the next six months expects to eat into both inventory and floating debt in good style. The company is now devoting itself exclusively to the manufacture of automobiles.

**Wire Wheel Corp.** of America has notified stockholders that the payment on Jan. 1 of a 2 per cent dividend on account of its deferred dividends on preferred stocks has been postponed to conserve for the present its cash resources.

**Timken-Detroit Axle Co.** paid a dividend of 2 per cent on the common stock on Jan. 15. A 7 per cent cash dividend has been declared on the preferred stock, payable in quarterly instalments of 1½ per cent each, the first on March 1.

**Doss Rubber & Tube Co.,** Atlanta, has filed a petition requesting permission to amend its charter increasing the capital stock to \$1,000,000. If granted the new issue will be in preferred stock.

**Republic Motor Truck Co., Inc.,** for the nine months ended Sept. 30, shows total sales of \$14,303,862 and gross profit of \$2,989,598. Net profit for the period is \$1,248,065.

**United States Motor Truck Co.** paid on Jan. 10 the annual 7 per cent cash dividend on preferred stock and 2½ per cent cash dividend on common.

## Van Briggle Receiver Files \$100,000 Action

INDIANAPOLIS, Jan. 17—Another chapter in the troubles of the various Van Briggle industries was begun Jan. 10 when William E. Reiley, receiver for the Van Briggle Mfg. Co., filed suit in the Marion Superior Court, asking damages of \$100,000 in behalf of the company against L. H. Van Briggle, Ulric Z. Wiley, Henry Rominger, Frank Hilgemeier, George Weidley and Joseph Shepard, directors of the company. The company has been operating plants at Mooresville and Fowler, this State.

The suit is similar in character to the one brought several weeks ago by the receiver of the Van Briggle Motor Device Co. for damages amounting to \$275,000.

The complaint charges that the com-

pany was organized without assets or without the actual sale of stock. The company was incorporated last May for \$1,000,000 and shortly after that acquired the two plants above mentioned, both of which were liabilities rather than assets. The Fowler plant was assumed with an indebtedness of \$30,000. The Mooresville plant, the complaint charges, was bought for more than it was worth.

## Austin Seeks Funds to Finance Output

LONDON, Jan. 7—(*Special Correspondence*)—Sir Herbert Austin, chairman of the Austin Motor Co., in a circular to stockholders, explains the reasons for not paying the final preference dividend until after the stockholders annual meeting in March as a step to finance the company's output, and that deposits amounting to over \$35,000,000 have been paid.

It is contemplated to issue short term (well secured) debentures, a form of financing at present in favor in Britain.

The material and supply trade doing business with the Austin company has agreed to take nearly half of the proposed issue. The other moiety will be offered to employees, stockholders and customers, and the general public.

## Ford Calls Employees to Receive Bonuses

DETROIT, Jan. 17—During the first three days of this week 22,600 workers of the Ford Motor Co. are on the list to call and receive bonus checks. To-day 3,300 employees of the Highland Park plant and 5,500 usually employed at the River Rouge works. On Tuesday, 2,600 are to receive their bonus in Detroit and 5,100 in River Rouge; while for Wednesday, there are 3,700 scheduled to come to the Highland Park plant and 2,400 to the works in River Rouge. The men are being called in by groups and according to their badge numbers. All told, 52,000 of the workers of the entire Ford organization which embraces besides the Detroit and River Rouge plants, all the assembling plants in the country and in some of the foreign countries are to get bonus money. The total to be distributed will be approximately \$8,000,000 it is said, and the amount per man will range from \$50 to \$450.

## STEPHENS RESUMES FEBRUARY 1

FREEMPORT, ILL., Jan. 17—Stephens Motor Co., will resume operations Feb. 1. Contracts signed with distributors of Chicago, Spokane and San Francisco, forces the resumption of operations somewhat sooner than anticipated. Starting with the New York show, the Stephens company will exhibit at twenty-one other shows from coast to coast, and from these orders are anticipated which will insure the steady operation of the plant during the entire year. Orders so far received in 1921 are greater than during the same period of 1920. The total cars shipped in 1920 was 6,956.

## Bank Credits

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, Jan. 20—The large withdrawals of Government funds from local banks had no outward effect on the money market last week. The break in money rates, which had long been expected, came on Monday of last week, when call loans were made during the day at 6 per cent. The range for the week was 6 per cent to 7 per cent, as against a flat 7 per cent the week before. On Thursday the renewal rate was 6 per cent, at which rate it has since remained. A greater break came in the outside market, where call money was quoted at as low as 4 per cent on Wednesday, the lowest rate in more than a year. Time money also eased considerably. Sixty and ninety day paper and four and five months' paper were quoted at 6 per cent, while six months' paper was quoted at 5½ per cent to 6 per cent. A week earlier 7¼ per cent to 7½ per cent was quoted for sixty to ninety day paper and 7 per cent to 7¼ per cent for the longer maturities. The rates last week were the same for loans secured either by regular mixed collateral or all industrial collateral.

The reserve position of the New York Federal Reserve Bank last week was the best since November. Total gold reserves decreased \$8,524,000, and total cash reserves decreased \$5,560,000. On the other hand, net deposits declined \$35,645,000, total bills on hand \$82,422,000, and total earning assets \$67,337,000.

Total earning assets at \$969,760,705 were the lowest in more than a year. Only once last year was this item reported under \$1,000,000,000; on Jan. 16, 1920, it was \$993,321,620. Federal Reserve notes in circulation, \$800,121,480, were the lowest since last February.

## Receiver Appointed for Watson Products

SYRACUSE, Jan. 19—Milton Delano, president of the State Bank of Canastota, N. Y., has been named receiver for the Watson Products Corp., manufacturers of Watson motor trucks. The appointment was made by Federal Judge George W. Ray at Norwich following a friendly equity action designed to conserve the assets of the company and is a part of a reorganization program. The new company will be known as the Watson Truck Corp. and creditors of the Products Corporation have signified their willingness to accept stock in the truck corporation in part payment of present claims.

## ALLEN PRICE DOWN \$200

COLUMBUS, Jan. 19—A price reduction of \$200 on open models was announced to-day by the Allen Motor Co. They are reduced from \$1595 to \$1395. More elaborate models are to be featured, giving the choice of four colors, three styles of wheels and cord tires.



## Men of the Industry

**H. H. Hill** has been appointed superintendent of the Petroleum Experiment Station of the United States Bureau of Mines at Bartlesville, Okla. Hill, who for the past year has been superintendent of the station, succeeds E. W. Waggy, who recently resigned to accept a position as production engineer with the Standard Oil Company of California. M. J. Kirwan, formerly State oil and gas supervisor for the California State Mining Bureau, and who recently spent a year in Japan with the Nippon Oil Company, has been detailed to the Bartlesville station to have general charge of the drilling and production work.

**Fred H. Ayers**, sales manager for Fisk Rubber Co., has been promoted to director of sales, in charge of the sales, advertising and publicity departments. His successor as sales manager will be William Weild, formerly assistant in this position. Leon N. Southmayd and Charles H. Gage have been made assistant sales managers. Karl S. Chamberlin, formerly assistant manager of export sales, has been made manager of this department.

**L. G. Fairbanks** has been made director of sales of the Firestone Tire & Rubber Co., a post heretofore held by Vice-President A. G. Partridge. Fairbanks was formerly general manager of the Firestone Steel Products Co. He has already appointed G. A. Richards in charge of all Firestone activities in Michigan; George Burkitt, manager of the Detroit branch, and P. M. Thomas, office manager of the Detroit branch.

**J. W. Pickavant**, of J. W. Pickavant & Co., Birmingham, England, is in the United States in the interest of the British motor, motorcycle and engineering trades. He plans to sail for home the last of this month. Pickavant says that the British motoring public has demonstrated its willingness to use American automobile accessories and that large quantities of them now are being used in that country.

**Gaylord A. Hoyt** and **W. N. Grounsell** have joined the sales force of the Franklin Automobile Co., Syracuse. Hoyt was with the Bell telephone system for the past twenty years and for the past twelve years had acted as district plant superintendent for the New York Telephone Co. Grounsell was for eight years with the Buick Motor Co., acting as a special representative under W. C. Durant.

**H. A. Oswald**, secretary and treasurer of the Hamilton Motors Co., Grand Haven, Mich., and recently factory manager, has been made acting general manager, succeeding W. G. Jarmon. Adolph Pricken, president, of New York, plans to devote a good share of his time to the management of the factory.

**George T. Briggs**, in charge of the automotive department of the Sinclair Oil Co., was elected president of the Motorcycle and Allied Trades at its annual meeting last week. E. H. Wetzell was elected vice-president, Arthur Davidson, treasurer, and W. H. Pearson, secretary.

**Edward R. Tinker**, director in the Willys companies and various other automobile corporations, has been elected president of the Chase Securities Corp., a subsidiary of the Chase National bank. He succeeds A. H. Wiggin, who becomes chairman of the board.

**E. Hives**, who has been for more than ten years chief of the experimental department of the Rolls-Royce British plant, is in America checking up on certain points in connection with the products of the American factory at Springfield, Mass.

**Joseph E. Pogue**, who has been manager of the department of economic research for Sinclair Oil Corp., has resigned from that company's service and has opened an office as consulting engineer on fuel topics at 29 Fifth Avenue, New York.

**A. P. Sloan, Jr.**, a vice-president of the General Motors Corp. and president of the United Motors Corp., has been elected a director of the Penn Seaboard Steel Corp. Ernest du Pont also is a director of the company.

**Myron T. Herrick**, former ambassador to France, has been elected president of the Aero Club of America, succeeding Col. Jefferson De Mont Thompson. Herrick has been interested in aviation since the early flying days.

**W. C. Chapman** has resigned as export advertising manager for Hares Motors, effective Feb. 1. He formerly was with the Packard Motor Car Co. in the same capacity and has been in export work for five years.

**E. A. Taylor**, production engineer for the Pierce-Arrow Motor Car Co., has become general manager for the Liberty Motor Car Co. It is expected that his advent will result in several changes in the Liberty personnel.

**R. W. Levenhagen**, prominent in paint and varnish circles from coast to coast, through his long identification with the Sherwin-Williams Co., has joined the organization of the Glidden Co., Cleveland, O.

**Arthur H. Blanchard**, consulting highway and transport engineer, Ann Arbor, Mich., has been retained by the city of Colorado Springs in connection with its \$1,200,000 paving program.

**Fred Lampe**, formerly production engineer for the Remington Typewriter Co. at Ilion, N. Y., has become superintendent of the Automatic Straight Air Brake Co. factory in New York City.

**B. J. W. Kelley**, formerly with Gray & Davis, Inc., has been appointed eastern representative for the American Distributing Co. He will open a New York office in the near future.

**H. V. Goodenough**, general manager of A. J. Miller & Co., Bellefontaine, for the past six years, has resigned to accept a similar position with the Lorraine Car Co., Richmond, Ind.

**L. P. Prossen**, formerly vice-president of the Nilson-Miller Co., has become connected with the Ortig Motors Co., Inc., New York, as secretary and treasurer.

**A. R. Johnson**, formerly of the Cadillac Motor Car Co., Detroit, has been appointed assistant sales manager of the Auburn Automobile Co., Auburn, Ind.

**Henry Kissel**, formerly service manager for the Splittorf Electric Co., is now in charge of the repair department of the American Bosch Magneto Co.

**Robert T. Walsh**, formerly advertising manager of King, has been appointed assistant sales and advertising manager of the Apex Motor Corp.

**G. W. Hoyt** has severed his connection as chief engineer of the Oakes company and is preparing to enter the manufacturing business for himself.

**L. G. Peed**, formerly territorial man in the East for the Willys-Overland Co., has been made manager of the Toledo branch.

**Joseph W. Bramwell** has resigned as sales and technical engineer of the American Bronze Corp.

### REEVES ON SPEAKING TOUR

**NEW YORK, Jan. 18**—Alfred Reeves, general manager of the National Automobile Chamber of Commerce will leave to-day for Milwaukee where he will speak to-morrow before the Wisconsin State Automobile Dealers Association. This address will be the first of the series before representatives of all branches of automotive industries. Reeves will be in Des Moines, Jan. 21, Omaha, Jan. 24, Kansas City, Jan. 25, St. Louis, Jan. 26 and 27, and Chicago, Jan. 28. He will tell the dealers and others the present situation in the industry and show them that there is no reason why they should be despondent.

### VISIBLE PUMP NAMES OFFICERS

**FORT WAYNE, IND., Jan. 17**—At the annual election of directors held by the Visible Pump Co., the following were elected: A. Z. Polhamus, H. E. Dean, S. B. Rohrer, W. M. Roth, C. E. Shell, C. S. Fair, Allen M. Hartzell, W. H. Schnelker, Fred Wehrenburg and C. F. Koelinger. Following the election the directors met and named the following officers to serve during the ensuing year: President, A. Z. Polhamus; vice-president, H. D. Dean; treasurer, S. B. Rohrer and secretary, W. M. Roth.

### WOODHOUSE VISITS AMERICA

**LONDON, Jan. 5**—(*Special Correspondence*)—The chairman of the S. T. D. (Sunbeam, Talbot & Darracq) motor combine told the stockholders that the combine's purchase of Jonas Woodhead & Sons, Inc., the leading leaf spring makers to the British motor industry, has shown extremely satisfactory results, and that the managing director of the company was then in America "with the object of studying improvements which American spring makers have made during the war."

### JULIUS WEISS DIES

**CHICAGO, Jan. 14**—Julius Weiss, a pioneer in the automobile business and president of J. Weiss & Son, builders of automobile bodies and builders of one of the first automobile bodies in Chicago, died at his home here last week. He was aged 55.

### T. J. KELLEHER DIES

**NEWARK, N. J., Jan. 17**—Thomas J. Kelleher, mechanical superintendent for the Splittorf Electric Co., died at his home here after a brief illness following an operation. He formerly was with the Hendee Mfg. Co. at Springfield, the Remy Electric Co. at Anderson, Ind., and for 21 years with Western Electric Co.

# Calendar

## SHOWS

- Jan. 22-27—San Francisco, Second Annual Pacific Coast Automotive Equipment Exposition, Auditorium.
- Jan. 22-29—Baltimore, Annual Automobile Show, Baltimore, Automobile Dealers' Ass'n, 5th Regiment Armory, J. C. O'Brien, Mgr.
- Jan. 22-29—Cleveland, Annual Passenger Car Show, Cleveland Mfr's & Dealers' Ass'n, Wignmore Coliseum.
- Jan. 22-29—Montreal, Annual Automobile Show, Montreal Automobile Trade Ass'n, Motordrome Bldg.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Jan. 31-Feb. 5—London, Ont., National Automobile Show of Western Canada, London Chamber of Commerce, Armories, T. C. Kirby, Mgr.
- Feb. 5-12—Minneapolis, Annual Automobile Show, Minneapolis Automobile Trade Ass'n.
- Feb. 7-12—Columbus, National Tractor & Implement Club, Ohio State Fair Grounds.
- Feb. 7-12—St. Louis, Annual Automobile Show, St. Louis Automobile Mfr's & Dealers' Ass'n, Robt. E. Lee, Mgr.
- Feb. 12-19—Hartford, Conn., Annual Automobile Show, Hartford Automobile Dealers Ass'n, Armory, Arthur Fifoot, Mgr.
- Feb. 12-19—Kansas City, Annual Automobile Show, Kansas City Motor Car Dealers' Ass'n.
- Feb. 14-19—Winnipeg, Western Canada Automotive Equipment Show.
- Feb. 18-28—San Bernardino, Cal., National Orange Show, Fred M. Renfro, Mgr.
- Feb. 19-26—San Francisco, Fifth Annual Pacific Automobile Show, Exposition Auditorium, George Mahlgreen, Mgr.
- Feb. 21-26—Louisville, Annual Automobile Show, Louisville Automobile Dealers Ass'n, First Regiment Armory, C. L. Alderson, sec'y.
- Feb. 21-26—Salt Lake City, Annual Automobile Show, Intermountain Automotive Trades Ass'n, W. D. Rishal, Mgr.
- Feb. 26-Mar. 5—Buffalo, Annual Automobile Show, Buffalo Automobile Dealers Ass'n, 74th Regiment Armory, C. C. Proctor, Mgr.
- Mar. 2-10—Des Moines, Annual Automobile Show, Coliseum, C. G. Van Vliet, Mgr.
- Mar. 5-12—Atlanta, Annual Automobile Show, Atlanta Automobile Dealers' Ass'n, Auditorium, Virgil Shepard, Mgr.
- Mar. 5-12—Brooklyn, Annual Automobile Show, Brooklyn Motor Vehicle Dealers' Ass'n, 23d Regiment Armory, George C. Lewis, chairman.
- Mar. 5-12—Pittsburgh, Annual Automobile Show, Automotive Ass'n, Inc., Motor Square Garden, J. J. Bell, Mgr.
- Mar. 7-12—Syracuse, N. Y., Annual Automobile Show, Syracuse Automobile Dealers Ass'n, Armory, Howard H. Smith, Mgr.
- Mar. 7-12—Indianapolis, Annual Automobile Show, Indianapolis Automotive Trade Ass'n, Automotive Bldg., State Fair Grounds, John Orman, Mgr.
- Mar. 12-19—Boston, Annual Automobile Show, Mechanics Bldg. and South Armory.
- Mar. 14-19—Omaha, Annual Automobile Show, Omaha Automobile Trade Ass'n, Inc., Omaha Auditorium, C. G. Powell, Mgr.
- April 4-9—Seattle, Annual Automobile Show, Seattle Motor Car Dealers' Ass'n, Arena Hippodrome.
- April—Chattanooga, Tenn., Spring Automobile Show, Chattanooga Automotive Trade Ass'n, Sunday Tabernacle, C. A. Noone, sec'y.

## FOREIGN SHOWS

- Jan. 22-29—Colombo, Ceylon Motor Show.
- Feb. 7—Delhi, India, Delhi Motor Show.
- Mar. 23-28—Witwatersrand Agricultural Show including machinery and motors sections.

## CONVENTIONS

- Feb. 2-4—Chicago, First Annual Meeting, Automotive Electric Service Assn. Hotel La Salle.
- May 4-7—Cleveland, National Foreign Trade Council.
- Oct. 12-14, 1921—Chicago, Twenty-Eighth Annual Convention National Implement & Vehicle Ass'n.

## Rubber Association to Have Export Section

NEW YORK, Jan. 18—Directors of the Rubber Association of America, meeting here to-day, determined to go ahead at once with the formation of a foreign trade department which would seek to aid member manufacturers of tires and rubber goods in the expansion of export trading. This department was recommended at the general meeting of the association held during show week but was referred to the directors for final action.

Under the plans for the new department, an export manager will be employed and the activities gotten under way at once. These will consist of research, publicity, advisory and other work of a similar nature.

Further consideration of the program of expansion also recommended at the general meeting was held up until the next meeting in February. This additional program includes the establishment of departments of publicity, cost accounting, industrial relations, research, statistics and technical and standardization.

## GILBERT & BARKER BUILD

SPRINGFIELD, MASS., Jan. 17—Several large additions to the plant of Gilbert & Barker Mfg. Co., this city, are being hurried to completion in anticipation of an early return to normal manufacturing conditions. The new units are a foundry, 400 x 100 ft.; three-story manufacturing building, 240 x 60 ft.; sheet metal department addition, 180 x 160 ft.; storage building addition, 40 ft.; addition of two turbine units to power plant. Nearly a whole city block has

been bought adjoining the present factory site to allow for future expansion. The company manufactures gasoline filling stations, lubricating oil storage and distribution systems for factories, and heat treating furnaces for the metal trades.

## Mexican Trade Good; Sales on Gold Basis

SAN ANTONIO, TEX., Jan. 17—According to Ralph Trejo, general sales manager for the Triangle Sales Co., who has just arrived here from a six weeks' sales trip through Mexico, business conditions in that country have been especially good recently, so far as selling automobiles and accessories are concerned.

"Automobile Row in the City of Mexico is a most interesting highway," said Trejo. "All sales are for cash and almost all is gold, very little silver being in circulation, and no currency. The accessories flank the automobile shops proper, and are a vital part of the business. French and English cars, in very high-priced models, are sharp competitors with American-made machines, but in the medium-priced and cheap cars the American has practically no competition."

## U. S. C. C. SETS CONVENTION

WASHINGTON, Jan. 15—Selection of Atlantic City as the meeting place of the Chamber of Commerce of the United States was announced here to-day. The ninth annual convention will be held April 27, 28 and 29. The representatives of American business will assemble in an effort to shape a definite program of co-operation.

## Belgium to Continue December Exhibits

PARIS, Jan. 5—(Special Correspondence)—Belgium has fixed on the period Dec. 3 to 15 for her next automobile show which, like previous events, will be held in the Cinquantenaire Palace, Brussels. This show will be open to the entire automotive industry and will be international. In order to eliminate rival events, it has been decided that no automobile exhibits shall be allowed at the Brussels Trade Fair, to be held during the summer. Firms taking part in this will be refused admission in the Brussels, London and Paris automobile shows. Belgian automobile manufacturers have also decided to boycott the motorcycle and bicycle show announced for next March in Brussels.

The European show program is now complete, the series opening with the Paris exhibition in the Grand Palais on Oct. 5 to 16. London will hold two shows, the first one being devoted to trucks on Oct. 14 to 22, and the second one for passenger cars being held from Nov. 4 to 12 inclusive. Belgium closes the series with Dec. 3 to 15. It is not known if Milan will have a show, and a motor exhibition in Berlin next winter is doubtful.

## NASH TO ADDRESS N. A. D. A.

ST. LOUIS, Jan. 15—The annual master address at the convention of the National Automobile Dealers Association will be made by Charles W. Nash, president of the Nash Motor Co. The convention is scheduled for Chicago during National Show Week there and it will sound the "Back to Selling" war cry of the association to 35,000 members.